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TREATMENT OF CEREBROSPINAL FEVER WITH SULPHAPYRIDINE

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Cerebrospinal fever appears to have been unknown in Shanghai until 1918; at any rate, there are no records of the disease in the vital statistics of the Public Health Department, Shanghai Municipal Council, although it is reported as occurring sporadically in the Yangtsze Valley.

In 1918 an epidemic of cerebrospinal meningitis was experienced in Hong Kong which lasted from January to June. Over 1,000 cases were reported, of which only four were in Europeans. There were 760 deaths. A minor epidemic had also occurred in Manila in 1915. In view of these epidemics in adjacent ports a keen look-out was kept for epidemics in Shanghai, and thirteen cases were diagnosed in 1918. A memorandum on the aetiology, clinical features, diagnosis, and treatment of cerebrospinal fever was then issued by the Public Health Department for the guidance of medical practitioners, and the disease was made notifiable. In 1919 there were twenty-three cases with twelve deaths, of which three occurred in children. Then in 1920 a greatly increased prevalence of cerebrospinal meningitis occurred, which reached epidemicity. It decreased, however, during subsequent years until 1929, when it again became epidemic. It will be noted that the fatality rate for cerebrospinal meningitis varied between 31 and 70 per cent., with a mean fatality rate of approximately 50 per cent., despite the use of anti-meningococcal serum in large doses intrathecally and intravenously.

Routine Treatment in Shanghai during the Past Decade

The routine treatment of cerebrospinal fever at the hospitals of the Shanghai Public Health Department during the past decade was as follows:

1. On admission bath and isolation in a quiet darkened room with temperature as near to 70° F. as climatic conditions allowed.

2. A purgative was administered, usually castor oil. Lumbar puncture and withdrawal of cerebrospinal fluid for confirmation of diagnosis were then performed.

3. Administration of serum intrathecally, in amount depending upon the quantity of cerebrospinal fluid withdrawn. (Cerebrospinal fluid was withdrawn until normal pressure was established, then polyvalent anti-meningococcal serum in quantity 10 c.cm. less than the amount of cerebrospinal fluid withdrawn was slowly injected. The usual amount was 10 to 40 c.cm.)

4. Lumbar puncture was repeated every twelve to twenty-four hours until root-pressure symptoms and headache disappeared, but also depending upon the pressure and flow of the cerebrospinal fluid. Cistern puncture was employed as and when necessary; anti-meningococcal serum was administered until meningococci disappeared from films and cultures—usually in four to seven days.

5. The patient was allowed up by gradual stages after temperature had been normal for ten days, provided all signs of the infection had disappeared, and, if considered to be fit, was discharged three weeks after temperature had returned to normal. The average stay in hospital under this routine was six to eight weeks—the shortest period four weeks; occasionally patients have had three months' hospitalization.

6. The diet was regulated according to the digestive powers of the patient.

7. Sleep was induced by sponging and hypnotics. Any other treatment was entirely symptomatic. Careful attention was given to the condition of the bladder in the early stages.

Results from this routine have been on the whole satisfactory, although the fatality rates were higher than in Western countries. This is due to the lower vitality of hospital-class Chinese from causes with which this report is not concerned, but it is also due to the unusually advanced state of the disease on admission. Statistics for foreign residents show variations similar to those of the Chinese population, but on the whole are better.

Treatment in the Recent Shanghai Epidemic

In 1938 Messrs. May and Baker introduced a new drug—2-sulphanilyl-aminopyridine (sulphapyridine). It

was decided to investigate its value in the treatment of cerebrospinal fever in Shanghai.

The latest epidemic of cerebrospinal fever began in December, 1938 (municipal "health year" 1939), and in January, 1939, the treatment of cases was divided into two groups as follows:

A. Serum Group.—Lumbar puncture on admission, repeated every twelve hours if no improvement, but only every twenty-four hours once definite clinical improvement was noticed. Punctures were discontinued when fever, rigidity, and other clinical signs had subsided. Serum was administered on each occasion of puncture. Specimens of blood—10 c.cm.—were also taken each time lumbar puncture was performed.

B. Sulphapyridine Group.—Lumbar puncture was performed on admission, and every twelve hours if no improvement, but every twenty-four hours after clinical improvement was noticed. Ten c.cm. of blood was taken on each occasion in addition to lumbar puncture. The dosage of sulphapyridine for adults was 4 tablets of 0.5 gramme on admission after lumbar puncture had been performed, repeated in four hours' time; then subsequently 2 tablets were given four-hourly for a further twenty-four hours, followed by 1 tablet thrice daily (total dosage about 40 tablets—that is, 20 grammes). When no improvement was noticed the dosage was maintained at 2 tablets every four hours. The dosage for children under 6 years and over 3 years was 1 tablet four-hourly; and for those under 3 years 1/2 to 3/4 tablet four-hourly. In severe cases double doses were given on admission. No other drug or treatment was administered to this group save ordinary stimulants. Diet and general nursing, however, followed the usual routine.

Precautions Observed.—Needles used in taking blood and cerebrospinal fluid were *dry* and were not dipped in alcohol. Specimen tubes were sterile and also absolutely *dry*. Waxed corks were used. The temperature of water in "containers" was 40° C. precisely. The tubes were labelled, stating (*a*) the time when the specimen was taken (hour and minute); (*b*) whether the case belonged to the serum group (A) or to the sulphapyridine group (B); (*c*) the number of the lumbar puncture and the total dose of sulphapyridine or serum given up to that time. Specimens were sent to the laboratory in containers immediately they were taken.

One hundred cases (fifty in each group) were treated according to the above plan. The fatality rate for Group A was 38 per cent. and for Group B 32 per cent. Though there was little if any difference in the statistics quoted, it was gratifying to find a fatality rate of only 32 per cent. in a group of cases in which no serum was used, bearing in mind both the fatality rate for cerebrospinal fever before the use of serum and also the high fatality rate in Shanghai in most epidemics previously experienced even when serum was used promptly and in large quantities. The amounts of serum used from 1927 to 1938 were as follows:

1927	3 litres	1933	9 litres
1928	12 "	1934	14 "
1929	29 "	1935	12 "
1930	50 "	1936	8 "
1931	20 "	1937	7 "
1932	13 "	1938	29 "

Clinically the cases in Group B followed a more favourable course. Headache disappeared rapidly, and most of the patients, even if unconscious on admission, could answer questions intelligently after twenty-four hours' treatment. Rigidity also disappeared more rapidly than in the serum group and fewer punctures of the theca were required.

It was then decided to combine these two bactericidal agents as a third group (Group C) and to institute one further investigation—namely, the effect of sulphapyridine plus meningococcal antitoxin (P. D. and Co.)—that is, a bactericidal agent and an antitoxic agent (Group D). Alternate cases were placed in Groups C and D.

Group C.—Dosage with sulphapyridine was exactly the same as in Group B. Treatment with serum was administered on precisely the same lines as in Group A.

Group D.—Dosage with sulphapyridine was identical with that of Groups B and C. Meningococcal antitoxin was also given in full doses (20 c.cm.) intravenously on admission, and simultaneously a similar dose of antitoxin was injected intramuscularly. The intramuscular dose was repeated in twelve hours if the condition of the patient had not improved. Subsequent dosage was determined by improvement or otherwise in the clinical condition.

Treatment was unaltered in any other manner. Groups C and D, however, contained only thirty cases each owing to the subsidence of the epidemic.

The fatality rate for Group C was 26.6 per cent., while that of Group D was 20 per cent. These statistics were superlative for Shanghai, but as the groups were so small statistical deductions are open to criticism. Some further comments are necessary from the clinician, however, since he usually has a secret contempt for mere figures and sees each patient as an individual in whom success must be 100 per cent. or *nil*. The outstanding observation was the rapid disappearance of symptoms in cases treated with sulphapyridine: furthermore, relapse, which occurred in approximately one-half of the cases treated with serum, was a rarity with sulphapyridine therapy. Cases might not improve with the drug, but if improvement began it was almost always maintained. The following figures will give an impression of the comparative recovery rate for each group:

Group	Total Cases	Recovered Cases	Fit for Full Diet in 1 Week	Discharged in 4 Weeks
A	50	31 (62%)	50.0%	32.2%
B	50	34 (68%)	76.4%	67.6%
C	30	22 (73.3%)	95.6%	90.9%
D	30	24 (80%)	91.6%	83.3%

Note.—The last two columns apply to recovered cases.

The results for Group C were considerably better than for either Group A or Group B. Presumably two antibacterial agents were better than one. On a theoretical basis Group D should have given the most satisfactory results. Statistically this appears to have occurred, although clinically there was little if any observable difference in the reaction to treatment of cases in Group D from that of Groups B and C. Recovery in Group D cases appears to have been somewhat slower than in Group C cases. Table I gives the number of clinical days of disease and days of treatment of recovered cases, with their length of stay in hospital.

TABLE I.—*Clinical Days of Disease, Treatment, and Length of Stay of Recovered Cases*

Duration of Disease Before Admission					Period of Treatment					Stay in Hospital				
Days	Cases				Days	Cases				Weeks	Cases			
	A	B	C	D		A	B	C	D		A	B	C	D
1–3 ..	22	20	13	17	1–3		3	2	1	3	1	6	1	1
4–7 ..	7	9	6	6	4–7	18	23	19	21	4	9	17	19	19
8–14 ..	1	4	2		8–10	8	7	1	1	5	15	9	1	3
15–30 ..	1	1		1	11–14	2	1		1	6	4	1	1	1
Over 30 ..					15–21	2				7		1		
? ..			1		22–28	1				8	2			

TABLE II.—*Effect of Treatment for Various Age Groups*

Age	Cases				Died				Fatality per cent.			
	A	B	C	D	A	B	C	D	A	B	C	D
Under 6 months	3	5	3	1	2	2	2	–	66.6	40	66.6	–
„ 1 year ..	2	4	1	1	2	2	1	1	100	50	100	100
„ 5 years ..	5	11	4	2	2	5	4	–	40	45.4	100	–
„ 10 „ ..	8	9	5	6	1	3	–	1	12.5	33.3	–	16.6
„ 20 „ ..	23	13	11	10	6	3	1	1	26	23	9	10
„ 30 „ ..	5	4	3	5	2	1	–	–	40	25	–	–
„ 40 „ ..	2	3	1	4	2	–	–	2	100	–	–	50
„ 50 „ ..	2	1	1	–	2	–	–	–	100	–	–	–
„ 60 „ ..	–	–	1	1	–	–	–	1	–	–	–	100
Total ..	50	50	30	30	19	16	8	6	38	32	26.6	20

Table II shows the effect of these forms of treatment for various age groups, but the numbers per group are too small for any accurate statistical deduction.

TABLE III.—*Incidence of Rash and Septicaemia*

		Rash			Septicaemia	
		Extensive	Scanty	Negative	Positive	Negative
A	Cases	2	12	36	3	15
	Died	—	7	12	3	1
	Fatality ..	—	58.3%	33.3%	100%	6.6%
B	Cases	2	7	41	13	37
	Died	1	2	13	6	10
	Fatality ..	50%	28.5%	31.7%	46.1%	31.2%
C	Cases	3	8	19	7	23
	Died	2	—	6	3	5
	Fatality ..	66.6%	—	31.5%	42.8%	21.7%
D	Cases	4	5	21	4	26
	Died	—	—	6	1	5
	Fatality ..	—	—	28.5%	25%	19.1%

One very important factor is considered to have a bearing on the severity of the case—namely, the occurrence of septicaemia (Table III). This may appear in mild cases or in the severe fulminant type, which has a high fatality rate. A characteristic petechial rash is found in both forms, but in the severe form ecchymoses and haemorrhages are also of common occurrence.

Bacteriological Note

All specimens of cerebrospinal fluid received were centrifuged: films were then made and stained by Gram's method. Cultures were put up on blood-trypsin agar plates from the centrifugalized deposit. A positive report was issued on finding Gram-negative diplococci morphologically resembling meningococci either in direct films from the cerebrospinal fluid or by isolation on culture. Trypsin broth was used for blood culture, 5 to 10 c.cm. of blood being added to 50 c.cm. of broth in a 125 c.cm. Erlenmeyer flask. Cultures reported negative were either contaminated by extraneous organisms or remained sterile after ten days' incubation at 37° C. Three of the strains isolated were agglutinated by Mulford anti-meningococcal polyvalent serum to a titre of 1/320. Agglutination tests on the remainder were not done.

Blood cultures were made in 126 of the 160 cases treated. The first thirty-three cases in Group A and a case in Group B were not tested and are not considered here; the remaining 126 cases had the following death rates:

	Cases	Died	Death Rate
Blood culture positive	26	12	46%
„ „ negative	100	21	21%
Total	126	33	26.2%

Groups in which sulphapyridine was employed, particularly Group D, gave the best results. Table IV shows

TABLE IV.—*Effects of Treatment on Bacterial Activity*

Group	Total Cases	Recovered Pos. Mc. Cases	When Meningococci Disappeared after Treatment					
			Within 12 Hours	Within 24 Hours	Within 48 Hours	3–7 Days	Above 1 Week	Above 2 Weeks
A	50	27	11.1%	11.1%	14.8%	44.5%	14.8%	3.7%
B	50	22	41.0%	9.0%	18.2%	31.8%		
C	30	20	55.0%		10.0%	35.0%		
D	30	19	31.6%	21.0%	5.3%	42.1%		

the effects of treatment on bacterial activity. Group C was supreme in bacteriostasis, as expected, while Group A lagged somewhat behind the others. Table V shows the specific effect of sulphapyridine on meningococci in the cerebrospinal fluid. In the majority of cases it is seen that meningococci have disappeared from the cerebrospinal fluid within twelve hours, while in all cases they were absent within seven days.

TABLE V.—*Dosage of Sulphapyridine in Relation to the Bacteriostatic Effect of the Drug in vitro in the Recovered Group B Cases*

Age	Average Dose in Tablets (0.5 gm.) Q. 4 h.	Pos. Mc. Cases	When Meningococci Disappeared				
			Within 12 Hours	Within 24 Hours	Within 48 Hours	2–4 Days	Above 1 Week
Under 6 months	½–¼	1				1	
„ 1 year ..	½–¼	1				1	
„ 5 years ..	1 –½	3			1	2	
	2 –1	1		1			
„ 10 „ ..	2 –1	3	1		1		
	2½–1½	1	1				
„ 15 „ ..	2 –1	2	1			1	
	3 –1	1	1				
	4 –2	3	2	1			
„ 20 „ ..	4 –2	2	2				
„ 30 „ ..	4 –2	1	1				
„ 40 „ ..	4 –2	3			1	2	

Note—Throughout the experiment the average adult dose was two tablets (that is, 1 gramme) every four hours until clinical improvement was noticed, then gradually reduced to a maximum of 40 tablets, or 20 grammes. The initial two doses were given in double dosage. Dosage in children was reduced according to age.

Concentration of Sulphapyridine in Cerebrospinal Fluid

This was estimated by the following method: Five c.cm. of cerebrospinal fluid was diluted to 20 c.cm. with distilled water and 5 c.cm. of 20 per cent. trichloracetic acid was added. The mixture was then vigorously shaken and filtered. An aliquot portion of the filtrate, generally 20 c.cm., was cooled in ice to 0° C.; 1 c.cm. of 1 per cent. sodium nitrite was added and was then followed by an excess of 1 per cent. thymol in 20 per cent. sodium hydroxide. The yellow-to-orange colour was compared with a cerebrospinal fluid (from a normal patient who had not received drug treatment) to which a known amount of sulphapyridine was added in the laboratory and which was then treated in a similar manner. Pure alpha-aminopyridine treated as above gives no indication that the colour is due to the sulphonamide portion of the molecule.

Six hundred and sixty-four samples of cerebrospinal fluid were tested for sulphapyridine content. Sulphapyridine varied from 0.3 to 23 mg. per 100 c.cm. of fluid. No correlation could be found between the dose of sulphapyridine administered and the quantity detected in the cerebrospinal fluid.

Conclusions

Sulphapyridine appears to be a drug of exceptional therapeutic value in the treatment of cerebrospinal fever.

The value of the drug is probably greatest when combined with serum or antitoxin therapy.

The number of cases treated was too small for dogmatic statistical deduction, but results indicate that subsequent

epidemics should be treated with sulphapyridine in combination with either serum or antitoxin for further trial.

Dosage with sulphapyridine may be increased with impunity in subsequent trials and with the likelihood of improving results still further.

Summary

One hundred and sixty cases of cerebrospinal fever were treated in four groups: serum (50 cases), sulphapyridine (50 cases), sulphapyridine plus serum (30 cases), sulphapyridine plus antitoxin (30 cases).

Satisfactory results were obtained, fatality rates for the groups being 38, 32, 26.6, and 20 per cent. respectively.

The recovery rate was accelerated in the groups where sulphapyridine was employed.

Blood cultures were performed in 126 cases only; positive cultures were obtained in 100 cases, twenty-one of which ended fatally.

Concentration of sulphapyridine in the cerebrospinal fluid was estimated, but the concentration appeared to have little if any relation to the dosage.

No toxic reactions were experienced in any of the cases treated with sulphapyridine.

We wish to thank Messrs. May and Baker for their courtesy in supplying sulphapyridine (M & B 693) free of charge for this test upon request. We also wish to thank the staff of the hospitals and laboratories, especially Dr. K. W. J. Lieu, for their co-operation. We are indebted to Mr. L. H. Barton for the estimations and also to Mr. Fanthorpe.

GASTRIC DISORDERS IN THE SERVICES

BY

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Study of many medically unfit soldiers sent for treatment to civil hospitals since the outbreak of war indicates a very high incidence of disorders of the stomach and duodenum as causes of disablement among our troops; this applies both to troops evacuated from abroad and to those falling sick while on service in this country. Similar experience is being encountered by the medical boards, and it is true to say that gastric and duodenal disorders are the commonest medical causes for which soldiers are discharged from the Army as unfit for service.

Examination of 260 medical cases sent from France to sector hospitals in this country shows that no fewer than sixty-five (25 per cent.) were attributed to disorders of the stomach and duodenum, not including reflex dyspepsia secondary to appendicitis and cholecystitis. This group of disorders, which includes gastric and duodenal ulcers (approximately 50 per cent.), chronic gastritis, and functional dyspepsias, outclasses in incidence any other group.

Statistics from the War of 1914-18

The incidence of disorders of the stomach and duodenum admitted to hospital is given in tabular form in the *Official Medical History of the Great War* under "Statistics." Here is recorded the number of patients admitted to hospital under disease groups in (*a*) the B.E.F., 1914; (*b*) the B.E.F., 1915; and (*c*) British troops stationed in the United Kingdom. The heading "Indigestion, Inflammation, and Ulceration of Stomach and Other Diseases of the Stomach" occupies the eleventh, twelfth, and ninth places respectively in order of incidence, being preceded by (1) rheumatic fever, (2) disorders of locomotion; diseases of (3) the respiratory system, (4) intestines, (5) nervous system, (6) and skin; (7) venereal diseases, and (8) influenza.

It will be seen that gastric and duodenal disease at the highest rate occupies only a relatively minor place in case incidence so far as can be ascertained from the figures in the official table, whereas our figures show that this group has outclassed all other disabilities. This discrepancy can be ascribed to the following factors:

1. *The Greater Frequency of Gastric Disorders, particularly of Gastric and Duodenal Ulcer, in Recent Years.*—This has been a general experience, but the stoppage of the London Central Omnibus Service in 1937 provides further evidence (Hill, 1937). This was due to the feeling among the workers that their health was suffering as a consequence of working conditions up to that time. The Court of Inquiry subsequently held that the complaint was the high incidence of gastric disorders, which had been growing higher as the years passed and was attributable to a variety of causes bound up with working conditions. The Medical Research Council justified the workers' complaints and suggested remedies to reorganize the service (*Health of the London Central Busman*, 1939). The statistics showed a preponderance of gastric disorders in the service over the rest of the population and a higher incidence in drivers and conductors of buses than in tram-drivers or bus-maintenance workers. Many of these bus-drivers were sent over-seas for transport duties early in the war, and some figure among those returned sick to England with recurrent symptoms.

2. *Insufficiently Thorough Medical Examination before being Called Up in the Early Stages of the War.*—It is apparent that many of these men had suffered from gastric or duodenal ulcer for several years, while some had been investigated on various occasions in hospitals in the past. These facts were not elicited in the medical examinations at the outbreak of the war; these sufferers were accordingly admitted to the Army as fit men. In some cases the men carefully concealed their past histories in their endeavour to enlist.

Conditions in Civil Life preceding the War

Between January and September, 1939, all new outpatients seen by me at St. Mary's Hospital were classified. Study of male cases in the age groups (21 to 47) corresponding to those of the sixty-five patients mentioned above reveals that twenty-two out of sixty-eight (32.4 per cent.) were sufferers from disorders of the stomach and duodenum. These numbers are too few to be of much value. At the same time it must be realized that many of these patients were sent up by their doctors primarily for the purpose of being radiologically examined. Accordingly this percentage incidence is many times higher than the incidence in the general sick population and does not counter an assertion that the incidence of gastric disorders in the group of soldiers most of whom fell sick soon after arrival in France was excessively high, since less than a few months previously these men had been pronounced fit to be sent to the front line.

The present study is of a convoy of cases from France in the earlier stages of the war admitted to a sector

hospital near London on November 12, 1939. Of these 238 cases 174 were medical, of which no fewer than forty-one (23.5 per cent.) were cases of (primary) gastro-duodenal disorders, their relative incidence being such as to outclass in number any other disabilities, the other important ones being as follows:

Bronchitis, asthma, etc.	12
Convalescent pneumonia	11
Pulmonary tuberculosis	9
Rheumatic disorders	9
Heart disease: effort syndrome	7
" " organic	6
Epilepsy	6
Psychoneurosis: hysteria	7
Organic nervous disease	6

Previous Service in Regular Army

Total Gastric Disorders, all aggravated by service abroad, 41:

Group 1: Previous Army service (reservists)	24 (58.6%)
" 2: No previous Army service	16 (39%)
" 3: Symptoms arisen since onset of war	1 (2.4%)

Group 1.—These soldiers contracted their original disability:

(*a*) While in military service	14 (34.2%)
(*b*) In intervening period—that is, since previous service	7 (17.1%)
(*c*) Before Army service	3 (7.3%)

It is thus seen that, while symptoms in all forty-one cases were aggravated by the present war, in 34.2 per cent. the symptoms originally developed in military service. In Group (*b*) the patients' occupations were as follows: lorry drivers, 2; Regular Army (R.A.M.C. officer, retired); chauffeur; electrician; engine driver; odd jobs.

Group 2.—The civil occupations in this group were: lorry and bus drivers, 5; stevedores, 4; sedentary occupations (clerks, etc.), 3; locomotive firemen, 2; mechanics, 2.

Group 3.—In only one case had symptoms arisen in Army service since the onset of the present war.

Table showing Occupation

	Gastric Disorders	Control Cases
Lorry and engine drivers	9	6
Factory workers and mechanics	9	6
Labourers (heavy)	8	4
Regular Army and Navy	6	1
Clerks and sedentary workers	3	9
Porters, telegraphists	3	5
Odd jobs, manual workers	2	8

Cases admitted for diseases not involving the gastro-intestinal tract were used as controls.

Classification and History of Cases

Of the forty-one cases the classification after investigation was as follows:

1. Duodenal ulcer	19	Confirmed by radiological examination
2. Gastric ulcer	7	
3. Gastric and duodenal ulcer	1	
4. Pylorospasm without evidence of ulcer	7	
5. Unclassified dyspepsias	7	

Regular Army	3
Regular Reservists	20
Supplementary Reserve	18

These patients were all sent home from France for recurrent gastric symptoms, and by the time of their arrival in this country most of them had already undergone several weeks' treatment and investigation abroad.

The longest history was twenty-two years, the shortest one and a half years. One patient had a sudden haematemesis in France, but had had no previous dyspepsia. The bleeding was ascribed to a gastric cause, though no *x*-ray examination was considered necessary at the time of his arrival in this country.

Aetiological Factors

Tobacco.—There were three non-smokers in the series. One patient with a duodenal ulcer used to smoke as many as sixty cigarettes a day. The average consumption was 12.5. This agreed closely with the figure of 13.19 obtained from the records of fifty new out-patients in the same age group. While these figures are far too small to be of any genuine value it is felt that these patients tended to give us their peacetime estimates, being unaware that periods of idleness at the front, the long evenings remote from family life, and the reduction in price of tobacco in the Services had caused a not inconsiderable rise in their tobacco consumption. This idea was entertained because it was found that they could in no wise be induced to give up tobacco when so advised by the medical officers, and many preferred to persist with smoking in spite of the presence of mild intermittent pain throughout the day. Although Hunt (1937) gives a much higher incidence of non-smokers in his series of ulcer cases, it is probable that the incidence and quantity of tobacco consumption are higher in military circles generally and serve to aggravate gastric disorders, especially when other factors, such as oral sepsis, deficient mastication, occupation, unsuitable food, and nervous strain, are present.

Diet.—When the soldiers comprising this series were asked the cause of their symptoms while in France the bulk considered the Army food to be the main factor. To ascertain the factors incriminating the diet several soldiers from completely independent sources were closely questioned, and the following facts were learned:

1. There were generally three meals a day—at 7 to 8 a.m., 1 p.m., and 5 to 6 p.m. Nothing was provided, except at the canteens, between these times.

2. Milk was entirely from tins, fresh milk being lacking.

3. Meat was almost always served in the stewed condition and often undercooked, though tinned meats were also provided.

4. Ample quantities of main articles of diet, such as bread, margarine, and potatoes, were provided.

5. Vitamin C was probably deficient, green vegetables being very seldom provided, and fruit not at all.

6. Water was prohibited entirely, as unsafe. Several soldiers complained that they could quench their thirst only by buying beer or tea at the canteens. The latter was often strong, with little milk.

It is apparent that the adult healthy stomach should be able to digest and function well on this diet. On the other hand, this routine is undoubtedly productive of symptoms in soldiers with previous histories of ulcer and gastritis. This is particularly so when the change from their normal diet is sudden, whereas those in barracks in this country for a period before being sent to France are able to carry on as relatively fit men. Several Regular soldiers assured me that diet on home service is far more satisfactory than when improvised in France.

Oral Sepsis.—In about one-third of the cases oral sepsis may have played an important part. The responsible factors were usually pyorrhoea and gingivitis, though infected stumps and dental caries were common. In other cases mastication was clearly defective through the loss of some or all of the teeth, while one or two patients had ill-fitting dentures. In a few cases chronically infected tonsils were found, but it was not possible to

incriminate them as the sole factor responsible for the patient's condition.

Family History

Table showing Incidence of Family History (Only Near Relatives Considered)

Diagnosis	No. of Cases	Direct Evidence: *X*-ray or History of Operation on Ulcer	Indirect Evidence, incl. "Gastritis," Ulcers, Chronic Indigestion
Duodenal ulcer	19	6	3
Gastric ulcer	7	2	0
Pyloric spasm without ulcer	7	5	1
Gastric and duodenal ulcer	1	1	0
Dyspepsias unclassified ..	6	0	0
Total	40	14 (35%)	4 (10%)
Controls	50	2 (4%)	1 (2%)

Cases admitted for diseases not involving the gastro-intestinal tract were used as controls.

The high incidence of a positive family history is certainly striking in this series, and is in excess of the proportion (10 to 20 per cent.) estimated by Hunt (1937). From the above table it is seen that though no direct evidence of ulcer is found in the family history a gastric diathesis is often present in the relatives, some having ulcers, others symptoms ascribed to acid dyspepsia, nervous dyspepsia, and chronic gastritis from any known cause.

Operative Treatment

Three patients were advised operation.

In one case, that of a weaver aged 35, a deformity of the duodenal cap was found on radiological examination. The history was of twenty-three years' standing. He had been a patient in ten different hospitals, and had been operated upon for perforated duodenal ulcer in 1932, shortly after appendicectomy. His three sisters and grandfather had had gastric ulcers, and his mother had died from perforation of an ulcer. A partial gastrectomy was performed by Sir Thomas Dunhill, and the report on the specimen is as follows: "A small sleeve resection not including the pylorus: no signs of ulcer found in any part of the specimen. *Microscopy:* Acute inflammatory changes in muscularis, with collections of polymorphs around small blood vessels; chronic inflammatory changes in mucosa with some haemorrhages." No sign of duodenal ulcer was found at operation.

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Pyloric Spasm without Evidence of Ulcer

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The history is often of many years' duration, with intermissions and exacerbations, the latter more frequently in the winter months; occasionally severe haematemesis may occur, or occult blood may be found in the stools. Test meals give variable results. No reflex cause for the spasm, such as cholecystitis or appendicitis, is apparent, but in some of our cases oral sepsis, particularly gingivitis and pyorrhoea, had been found, and the tonsils were often chronically infected. Clinically these cases correspond closely to pyloric and duodenal ulcer and respond equally well to treatment on the same lines.

Golden (1937) and Faber (1935) have described gastroduodenitis and have emphasized its almost exact resemblance to duodenal ulcer in symptomatology. Christensen (1931), by inserting a rubber balloon filled with air into the stomach, showed that the late pains in this condition, as in duodenal ulcer, were caused by gastric contractions. The pains always coincided with the contraction records, but in normal subjects contractions occurred without pains. Further, duodenal ulcer patients had periods of freedom from pain, so that evidence has accumulated to show that gastric pain is due to inflammatory changes in the mucous membrane both in cases of gastritis and of ulcer.

Diagnosis depends on radiographs and gastroscopy. Golden, Schindler, and Henning agree that in many instances of antral gastritis no change takes place in the mucous membrane that can be seen with certainty by *x*-ray examination, and in such cases the disease may only be detected by gastroscopy. It may be seen, however, in operation specimens, particularly when Faber's formalin technique is used, as the only lesion in cases in which a false pre-operative diagnosis of peptic ulcer has been made.

Pathology

According to Golden inflammation of the deeper layers of the stomach wall, which often occurs in gastritis, hampers the normal movements of the mucous membrane and the muscularis mucosae over the underlying muscle, and causes irregularity of peristalsis. Holsti (1931) has demonstrated, in cases with severe digestive symptoms without ulcer, inflammatory changes in the neighbouring nerve plexuses in the muscularis and underlying muscle layers. Alvarez (1928) claims that there is evidence that these plexuses (myenteric) are concerned with relaxation reflexes: their damage or removal causes a rise in tone sometimes so pronounced that rhythmic contraction becomes impossible. These inflammatory changes in the neighbourhood of the vagal nerve endings are found in gastritis and are responsible for the pyloric spasm.

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muscularis almost always associated with what they call "pyloro-antritis." These findings may be further evidence of gastritis in the pyloric region being itself the cause of pyloric spasm. The possibility of pyloric spasm being caused by anxiety states and states of nervous hyperexcitability without inflammatory changes is debatable, but the bulk of the evidence seems against such a view. Of the three cases described two show such abnormal states; they all had pylorospasm without evidence of ulcer.

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There was tenderness high up over the right rectus muscle. The teeth and gums were healthy. A fractional test meal showed no free acidity in any specimen. The total acidity reached 16.8 c.cm. N/10 HCl at forty-five minutes and was 10.8 c.cm. at sixty minutes; the stomach was empty in two and a half hours. *X*-ray examination revealed normal position and tone; there was some residual fluid in the stomach at the start, suggesting hypersecretion; the curves and surfaces were clear; marked spasm was seen at the pylorus. The duodenal cap when filled was normal. The blood count was normal, and a test for occult blood was negative on two occasions. The patient quickly responded to treatment with dilute hydrochloric acid at meals and tincture of belladonna.

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On examination the tongue was mildly inflamed; the teeth were satisfactory. There was only mild tenderness in the mid-epigastrium and slight rigidity to the left of the midline. A soft apical systolic murmur and marked tachycardia were present, the pulse rate often rising to 100 and on one occasion to 138, though the basal rate was between 70 and 80. The fasting juice amounted to 20 c.cm. The total acidity was 60 c.cm. N/10 HCl, and the free acidity 40 c.cm. N/10 HCl. There was a climbing curve to 100 and 90 c.cm. respectively at two and a half hours, after which the stomach was empty. *X*-ray examination showed the stomach to be normal in shape, size, and position, without deformity apart from spasm of the pylorus. Tests for occult blood were negative. The patient's gastric symptoms soon responded to treatment, though his pulse still rose unduly on exertion, and he complained at discharge of palpitations and dyspnoea.

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Case 3.—E. F., aged 44, an engine driver, gave a history of twenty years' indigestion, with epigastric pain on and off after meals, normally starting about three-quarters of an hour after, lasting about half an hour, and passing off, especially when he took powders. Pain often woke him about 3 a.m. Intermissions never lasted more than a week. He felt as if his food "passed across his abdomen from left to right." His symptoms were aggravated by anxiety and worry at work. He was in hospital four years ago, but was not radiographed. He was rather constipated and took his meals irregularly. He smoked about five cigarettes a day. The patient's father and two brothers had gastric ulcers.

Examination elicited that he had been edentulous for many years, his teeth being removed because they were "bad." There was tenderness over the duodenum and less so to the left of the midline, but no rigidity. Slight exophthalmos was present. The pulse rose on examination to between 90 and 100, and he flushed easily. Frontal headaches occurred very often, lasting all day. No ocular or other clear cause was discovered on examination. There was no thyroid enlargement or tremor. Radiological examination showed that the stomach was normal in position and tone, with curves and surfaces clear. There was marked pylorospasm. The duodenal cap when seen appeared normal. No lesion was found apart from spasm. Tests on November 27 and December 4, 1939, showed the presence of occult blood. On November 18 the resting juice amounted to 5 c.cm. and was slightly bile-stained. Free acid amounted to 13.5 c.cm. N/10 HCl; total acid, 13.5 c.cm. No free HCl was present in any other specimen. The total HCl never rose above 8. The stomach emptied in two and three-quarter hours. On examination four weeks later the amount of resting juice was 14 c.cm., of free HCl 9 c.cm., and of total acid 21 c.cm. Free HCl rose to 37 at one hour, and total acid to 58 in one hour. The stomach emptied in one and a half hours.

This patient responded well to treatment. While in hospital he suddenly collapsed in a faint for about five minutes, the attack being preceded by vertigo and giddiness. It was followed by headache. This attack was thought to be hysterical. His headaches were much improved by sedatives, but he was never cured.

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Conclusions

Disorders of the stomach and duodenum have become more common in medical practice during the last few years as causes of incapacity. This is a general experience, but the investigation carried out by the Medical Research Council after the London General Omnibus Company strike is further proof. Since the onset of the war a large number of troops, comprising approximately a quarter of the medical cases returned from the front, suffer from peptic ulcer, gastritis, or other dyspepsias. Further, many cases are also seen among troops who up to the present are stationed in England; but this incidence has not yet been investigated. In only a very small proportion of cases have symptoms originated since the present war, the patients all having recurrent symptoms from old-standing disabilities. In the war of 1914–18 this group of disorders apparently was far less often productive of incapacity, according to the available statistics.

It is difficult to compare with this series figures for the civil population before the war, but the probability is that if these could be obtained they would reveal an

incriminate them as the sole factor responsible for the patient's condition.

Family History

Table showing Incidence of Family History (Only Near Relatives Considered)

Diagnosis	No. of Cases	Direct Evidence: X-ray or History of Operation on Ulcer	Indirect Evidence, incl. "Gastritis," Ulcers, Chronic Indigestion
Duodenal ulcer	19	6	3
Gastric ulcer	7	2	0
Pyloric spasm without ulcer	7	5	1
Gastric and duodenal ulcer	1	1	0
Dyspepsias unclassified ..	6	0	0
Total	40	14 (35%)	4 (10%)
Controls	50	2 (4%)	1 (2%)

Cases admitted for diseases not involving the gastro-intestinal tract were used as controls.

The high incidence of a positive family history is certainly striking in this series, and is in excess of the proportion (10 to 20 per cent.) estimated by Hunt (1937). From the above table it is seen that though no direct evidence of ulcer is found in the family history a gastric diathesis is often present in the relatives, some having ulcers, others symptoms ascribed to acid dyspepsia, nervous dyspepsia, and chronic gastritis from any known cause.

Operative Treatment

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It is difficult to compare with this series figures for the civil population before the war, but the probability is that if these could be obtained they would reveal an

approximate agreement between the respective age groups. It should be remembered that some of these disorders in the Services are in troops who are engaged in driving convoy lorries and who in civil life are bus drivers and lorry drivers, in whom gastric disorders are known to occur so very often.

From this study it is clear that Army life causes recurrent symptoms to a great extent in the soldier with a previous history of gastric disease, but it remains to be seen to what extent Army life actually will cause the onset of these diseases in the future. There is need for a large-scale investigation of this problem. It is probable that defects in diet, which would be a difficult problem to remedy, long periods between meals, oral sepsis, excessive smoking, mental strain, and a familial tendency are in the main the responsible factors.

There have been a number of cases with pylorospasm without evidence of ulcer, in which the pathology is chronic gastritis with spasm combined with inflammatory changes in the gastric mucous membrane. These cases closely resemble clinically cases of peptic ulcer, and the exact diagnosis can be obtained with confidence only by the use of the gastroscope. It is doubtful whether the spasm is caused by mental strain alone, though the pain threshold may be lower in these subjects than in others. I believe these cases are distinct from the group of pure nervous dyspepsias.

Summary

A study is made of the disorders of the stomach and duodenum in the fighting Services, with special reference to a comparison of the incidence (*a*) in civil life before the war, (*b*) in the war of 1914–18.

These disorders outclass in incidence rate all other medical diseases in cases sent back from the front to two sector hospitals since the onset of the war. The reason for such a state of affairs is inquired into: it is found that Army life causes an aggravation of the diseases in patients who had previously suffered from them, but there is no evidence yet to show that the diseases will originate in soldiers healthy on joining up.

A brief study of pylorospasm without peptic ulcer is made, with a short discussion on the pathology. Three case records are appended.

My thanks are due to Professor G. W. Pickering for his criticism of this paper, and to Dr. W. D. W. Brooks and the medical superintendent of the sector hospital for allowing me to investigate cases under their charge.

REFERENCES

Alvarez, W. C. (1928). *Mechanics of the Digestive Tract*, Hoeber, New York.
Christensen, O. (1931). *Acta med. scand.*, Supp., **37**.
Faber, K. (1935). *Gastritis and its Consequences*, Oxf. Univ. Press, London.
Golden, R. (1937). *J. Amer. med. Ass.*, **109**, 1497.
Health of the London Central Busman, H.M. Stationery Office, London, 1939.
Hill, A. Bradford (1937). Industrial Health Research Board. Report No. 79, H.M. Stationery Office, London.
Holsti, O. (1931). *Acta med. scand.*, **76**, 316.
Hunt, T. C. (1937). *Practitioner*, **138**, 139.
Medical History of the Great War: Statistics, H.M. Stationery Office, London, 1931.
Ramond, F., and Jacquelin, C. (1935). *Arch. mal. Appar. digest.*, **25**, 618.

R. L. Nelson (*J. Pediat.*, 1939, **14**, 39), who records two personal cases of pertussis encephalitis with a review of the literature, states that the probable causes for neurological complications in whooping-cough are (1) encephalitis, haemorrhagic or non-haemorrhagic; (2) functional disturbances of the cerebral blood vessels; (3) spasmophilia, and (4) intracranial haemorrhage.

TREATMENT OF SEPSIS AND TRAUMA BY 3 TO 6 METRE SHORT-WAVE CURRENTS

BY

J. P. P. STOCK, M.D.

Honorary Physician, Burslem, Haywood, and Tunstall War Memorial Hospital; Honorary Medical Registrar, North Staffordshire Royal Infirmary

Short-wave currents were first introduced into medicine on purely empirical grounds, and it was therefore unfortunate that early enthusiastic reports on the method led to its widespread clinical trial before several fundamental questions had been investigated. In consequence further progress became impeded by two serious defects in its practice. In the first place no method of measuring the dose was adopted—and this alone will account for many conflicting clinical reports; and, secondly, its mode of action was studied in physical rather than physiological terms. Thus, in addition to lacking a system of dosage, indications for treatment were ill defined and had no rational basis. With such drawbacks it is scarcely surprising that short-wave therapy failed to find favour among many of the more critical members of the profession.

My personal experience of short-wave therapy relates primarily to the treatment of acute and chronic infections of the nasal, buccal, and pharyngeal mucous membranes. In attempting, however, to elucidate the physiological mechanism of its action I undertook the treatment of a large number of acute localized pyogenic infections, such as carbuncles, furuncles, whitlows, etc., and a series of chronic infective lesions such as pyorrhoea, chronic osteomyelitis, and infected minor injuries. These cases have been carefully controlled, and I am satisfied that from the clinical standpoint the method has most valuable therapeutic properties in the treatment of localized inflammatory lesions.

During the course of the experimental work the dose of each treatment has been measured by means of a specially constructed electrode (Burch and Stock, 1939), and it is now possible to formulate some general principles governing the response of inflammatory lesions to varied intensities of short-wave currents. In extension of this clinical study I have carried out some experimental work in an attempt to determine the physiological changes taking place when short-wave currents are applied to the body. It is interesting to consider the clinical phenomena first and subsequently to see how far these may be correlated with the experimental findings.

Treatment of Acute Inflammatory Lesions

The application of short-wave currents to acute localized pyogenic infections or to lesions resulting from trauma is followed as a general rule by two main therapeutic results. These are: (1) relief of pain; (2) accelerated resolution.

1. Relief of Pain

The application of short-wave currents produces symptomatic relief in the majority of painful conditions. This analgesic effect is of variable duration and is analogous to that produced by other forms of heat. In acute inflammatory conditions the reduction of oedema and the regression of the lesion which frequently follow short-wave treatment may result in the initial relief from pain remaining permanent.

2. Accelerated Resolution

The accelerated resolution of acute inflammatory lesions is well illustrated by a description of the changes which follow in isolated furuncles subjected to short-wave currents. This description is based on a series of isolated furuncles treated in the course of this investigation and compared with untreated controls.

Two possible courses may follow the application of short-wave currents to a boil: either regression of the inflammatory process takes place and clinically the boil may be said to have aborted, or else the stages of necrosis, liquefaction, and separation of the slough follow rapidly during the ensuing twenty-four to forty-eight hours. Two principal factors appear to determine which of these courses is followed. The first of these is the stage reached by the pathological process at the time of the treatment; the second is the duration and, above all, the intensity of the treatment.

When the short-wave currents are given within twenty-four hours of the onset of the boil regression without suppuration is the course most generally followed, provided that the dosage is optimal. On the other hand, where central necrosis has already taken place the more usual event is rapid liquefaction of the slough. This is not, however, invariable, for occasionally even at this stage regression may take place and the necrosed area, provided it is small, undergoes absorption instead of liquefaction.

When any acute localized infection is treated within three or four days of its onset it is found that the outcome is profoundly modified by the duration and intensity of the treatment. In the case of a single furuncle the short-wave current in these experiments has been applied by means of a metal "air-spaced" electrode with an area of 14.2 sq. cm. A second electrode, as a rule larger, was placed at some convenient site on the opposite side of the body. The current which is leaving the front face of the first electrode is measured at the electrode itself, and the optimum range of intensity for securing regression of the furuncle has been found to be 0.15 to 0.2 ampere applied for ten to fifteen minutes. Where current intensities of 0.25 up to 0.6 ampere are employed retrogression is unlikely; with currents of this order of intensity the result which commonly follows is first a characteristic bluish discoloration of the furuncle, often with increase in both pain and swelling, and then rapid necrosis of its centre and subsequent liquefaction and separation of the slough. Such a result, if it occurs within twenty-four to forty-eight hours, may well represent a shortening of the natural course when compared with the time of untreated controls, but it is obviously less satisfactory than regression.

With still higher current intensities, from 0.6 to 0.85 ampere, the result in two cases was extension of the area of induration and bluish discoloration of the overlying skin, followed by fairly extensive sloughing and delay in healing up to ten days, or even more. Experience with overdosage of other inflammatory lesions confirms the opinion that increase in the size and duration of the lesion is the common result.

There is a striking difference in the character of the discharge from a furuncle which has been treated by short-wave therapy and that from one not so treated. The purulent material retains the same colour, but is thin, abundant, and of watery consistency, in contrast to the glutinous clotted discharge which usually obtains. This change is apparent within the first twenty-four hours. When the lymphatic glands draining the affected region are enlarged and tender it is usual for these to diminish in size actually during the first application of the current, although they may be some distance away and well outside the path of the current.

This description of the changes which take place in furuncles subjected to short-wave currents is applicable generally to any localized pyogenic infection similarly treated, and the following principles may be summarized for acute conditions: (1) in the pre-suppurative stage currents of relatively low intensity usually secure retrogression and disappearance of the lesion; (2) application of currents with intensity greater than this is more likely to lead to precipitation of necrosis or, worse, to spread of the condition; (3) if suppuration or necrosis has already supervened before treatment is started the usual course is acceleration of resolution through the stages of liquefaction and separation of the necrosed tissue. Any regression of the inflammatory process is heralded or accompanied by a rapid reduction of the inflammatory oedema. This reduction of oedema appears to be of fundamental importance, and the effect may be conveniently studied in the oedema of simple trauma.

Treatment of Simple Trauma (Trauma without Infection)

The majority of minor injuries are followed by exudation of fluid into the tissues. This reaction is well marked in injuries of the face and in the supporting tissues of joints. In either situation discomfort, pain, stiffness, and swelling occur. When an application of short waves is made within twelve to twenty-four hours of the injury (employing the milder range of current intensities) there is immediate reduction of pain, swelling, and stiffness in the course of a fifteen-minute treatment. This reduction of swelling is always considerable and may be complete; subsequent recurrence is rare.

Treatment of Chronic Infection and of Infected Wounds

In general, the longer the interval that has elapsed between the onset of an inflammatory lesion and the time when it is first subjected to short-wave currents the less marked is the variation of response to variation of current intensity. In chronic infective lesions, broadly speaking, the difference in response to low or high dosage is one of degree only and not one of kind. The clinical changes which follow when chronic infections are treated by short-wave currents may be summarized as: (1) increased redness at the margin of the lesion; (2) reduction of any oedematous swelling; (3) reduction of discharge; and (4), coincident with (2) and (3), healing, usually by granulation.

My experience of the treatment of infected wounds has been confined for the most part to infected abrasions of the skin. Red indurated areas of skin with deep linear excoriations that are causing pain and limitation of movement have regularly been found to subside completely within twelve hours of being treated. A few superficial incised wounds in which sepsis had supervened have been treated with similar results; but the number is small, and I have not had the opportunity of controlling these against untreated cases.

Mode of Action of Short-wave Currents: Experimental Observations

The therapeutic properties of short-wave currents do not appear to depend on any bactericidal action. Earlier claims in this direction have not been substantiated, and clearly no such mechanism is involved in the case of simple trauma. We may therefore conclude that short-wave currents produce their effects through some physiological mechanism evoked by their passage through the tissues. The statement is widely made that dilatation of capillaries is the principal mechanism involved. The evidence on which this statement rests is based on experimental observations made on the web of a frog's foot. I have carried out some experiments in order to determine if human capillaries react to therapeutic short-wave doses in a similar manner. This work has been

mainly carried out with a special 16-mm. objective modified by the addition of an oversized oil-immersion front component. The source of illumination is a half-watt lamp the filament of which is imaged on to the skin by means of a corrected condensing system. The illumination is fed in through the margin of the oversize lens. This front component carries two advantages: in the first place the oil does not tend to run away and does not therefore require constant replenishing; and in the second place the N.A. of the objective is increased from 0.28 to 0.42. The objective itself has been used as the electrode (insulated from the rest of the microscope). It is surrounded by a guard electrode with which it is in electrical contact only via the centre pole of a lamp socket. The current is fed into the guard electrode and reaches the objective through the filament of a low-voltage lamp. By matching the luminosity of this lamp with that of a comparison lamp fed with D.C. through a milliammeter, the current which is actually leaving the objective for the skin can be measured with a high degree of accuracy.

Experimental Observations on Human Capillaries

Direct observations were made of the capillaries at the bed of the nail where the loops run parallel to the skin surface. The movement of the individual red cells was watched before, after, and even during the application of short-wave currents. The following changes have been observed:

1. *Alterations in Calibre.*—There is no marked alteration in the calibre of capillaries which were already patent before the current was switched on. Neighbouring capillaries which had previously been closed were almost invariably found to open up.

2. *Alterations in Speed of Red Cell Flow.*—Acceleration of the circulation rate through the capillaries, as judged by the rate of flow of the red blood corpuscles, is the most constant finding both during and after exposure to short-wave currents. The slower the initial rate of flow the more readily can this change be demonstrated. It is common for the final speed to be too great for the individual red cells to be distinguishable and for an increased circulation rate to be discernible in the treated finger, compared with any other finger, for upwards of an hour. This is presumably the result of arteriolar dilatation—not visible to the microscopical examination.

Variations in the intensity of the current employed in these experiments produce corresponding variations in the degree of the effect observed. No evidence has been found of any difference in the *kind* of response of normal capillaries to different short-wave doses.

Discussion

Stasis of capillary flow is a characteristic feature of the circulation in the later stages of inflammatory lesions. Provided that the accelerated flow which is observed in these experiments on normal capillaries still obtains under conditions of inflammation, it will satisfactorily account for the changes which follow clinically when short-wave currents are applied to localized infection or trauma—that is, the rapid subsidence of oedema with regression or accelerated resolution. In chronic inflammatory conditions, in addition to reduction of oedema, flushing of the affected region with blood is probably equally important. A similar acceleration of flow in the capillaries of the skin may be produced by heat or even by simple massage. But since short-wave currents flow more or less evenly through tissue (and do not confine themselves to the body surface) we may expect that they produce a more or less uniform acceleration of capillary flow throughout the part under treatment.

In the experiments described the only difference observed in the capillary response to variation of current intensity is one of degree, and it must be admitted that this seems insufficient to account for the very great difference in the clinical course of acute inflammation which may result from variations of dosage. These differences are, however, peculiar to *acute* inflammatory lesions and are not seen in more chronic conditions; they are not, therefore, likely to correlate with corresponding differences discernible in experiments on normal capillaries. Clinical observations suggest the possibility that in acute lesions the higher current intensities actually lead to further dilatation and stagnation in the capillary circulation rather than to an acceleration of the flow.

Short-wave Currents in Treatment of Gunshot Wounds

The foregoing clinical and experimental observations indicate that the employment of short-wave currents can be regarded as a beneficial non-specific form of treatment for localized inflammatory lesions of infective or traumatic origin and justify the claim that there is a rational basis for the extension of their use in other fields of tissue injury. Although there is at present no available evidence concerning the action of short-wave currents in the treatment of gunshot wounds and other war injuries, clinical analogy suggests that, provided the injuries are localized, similar beneficial results would be obtained as have been shown to ensue from this form of treatment in the "peacetime" infections and injuries. In particular there appears to be good reason to believe that relief of pain, subsidence of inflammatory swelling and discharge, and accelerated recovery could be expected, and from my experience I believe these effects would be sufficiently striking to justify the general use of short-wave currents in the management of wound sepsis. From the practical standpoint this form of treatment would present very little difficulty, as the work could be very largely carried out by relatively low-powered portable sets, while the standardization of technique and the reproduction of the correct dosage are simple matters easily achieved under instruction by anyone familiar with any of the modern forms of electrotherapeutic apparatus.

My sincere thanks are due to C. R. Burch, Ph.D., for both suggesting and constructing the oil-immersion system employed in this work and for his continued technical advice and assistance throughout; also to Professor T. B. Davie for many valuable suggestions and criticisms.

REFERENCE

Burch and Stock (1939). *Brit. J. phys. Med.*, n.s., **2**, 127.

T. Cohen, M. Weichsel, and J. H. Lapin (*J. Pediat.*, 1940, **16**, 30) record their observations on 432 whooping-cough patients treated with various therapeutic agents. Vaccine treatment, which consisted of Krueger's vaccine, Sauer's vaccine, toxin vaccine, or Bordet vaccine, did not improve the symptoms, but was even associated with attacks which were more severe than those of the eighty controls. The results obtained with nasal topagen (soluble protein of *Haem. pertussis* in normal saline) and topagen hypodermically did not differ from those of the controls. Patients treated with convalescent serum and hyperimmune serum had fewer coughing spells, a shorter period of illness, and greater freedom from complications, but only when the serum was injected before the paroxysmal stage.

SOME NEUROLOGICAL COMPLICATIONS OF SERUM THERAPY

BY

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Involvement of the nervous system as a factor complicating serum therapy is not at all common; it seems to have been first noted by Thaon (1910) in describing a case of peripheral neuritis following the prophylactic injection of tetanus antitoxin. Subsequently Dyke (1918) reported a similar case in this country, while the subject has attracted much attention in France, notably by Lhermitte (1919, 1938), and, latterly, in America and elsewhere (Kraus and Chaney, 1937). Allen (1931) reviewed forty-two reported examples then extant in the literature, and he described the second case (which followed scarlatina antitoxin administration) to appear in this country. Out of 120 authentic cases that we have been able to discover on record more than half have followed the prophylactic injection of tetanus antitoxin in young adults, usually males, although every type of serum commonly employed has been incriminated. Recently Smith (1939) has reported a case in which deltoid paralysis developed after the transfusion of human blood on two separate occasions.

The characteristic lesions have been carefully discussed and classified by Bineau (1938), and appear to be localized either in the central or, more commonly, in the peripheral nervous system. In particular the fifth, sixth, and seventh cervical nerve roots, are affected, and occasionally the lumbar plexus. The onset is usually coincident with the signs and symptoms of serum disease, beginning about eight to fifteen days after serum administration with intense pain in the neck and shoulders which is probably radicular in origin and is accompanied by little or no objective sensory loss. This is followed by paralysis and by rapid and intense wasting of the muscles supplied by the nerves affected which reaches its maximum in from one to four days. The resulting syndrome is comparable to the Duchenne-Erb type of palsy. Tendon reflexes are diminished and changes occur in the electrical reactions, or, alternatively, a typical peripheral neuritis may occur. Involvement of the central nervous system is ushered in by a general serum reaction followed by collapse, vomiting, and, rarely, coma, and may be succeeded by hemiplegia, hemi-anaesthesia, or other protean signs suggesting widespread lesions. Optic neuritis and certain cranial nerve palsies—in particular, involvement of the third, seventh, eighth, and tenth nerves—have all been noted on occasion. The cerebrospinal fluid usually shows an increase of cells up to about thirty, mainly lymphocytes, the albumin being, as a rule, within normal limits. The pleocytosis is sometimes preceded by a slight rise in the sugar content. Finally, confusional states may occur, always, however, of a very temporary nature.

Considering their widespread employment, symptoms referred to the nervous system following the injection of anti-streptococcal and anti-scarlatinal sera appear to be very uncommon; we have been able to discover only ten cases in the literature. The following two cases therefore appear to be worthy of record.

Case I

A youth aged 17, an office clerk of normal physique, was admitted to the South-Eastern Hospital on February 2, 1939, with a moderate attack of scarlet fever of one day's duration. There was nothing relevant in the past history. He received 40 c.cm. of anti-scarlatinal serum intramuscularly into the right thigh. On the tenth day following he complained of pain in the right shoulder, but no serum rash or albuminuria developed. He was treated symptomatically for serum arthritis, and he improved slightly, though pain persisted. On March 4, twenty-four days after serum administration, a general reaction occurred; the temperature was 101°, pulse 120, and respirations 26, and he complained of inability to raise his right arm at the shoulder and of continuation of the pain in the shoulder and neck. By March 7 paralysis of the right deltoid was almost complete, with much wasting, and there was slight weakness of the right biceps. There was no objective sensory disturbance, and radiography and examination of the rest of the nervous system showed nothing abnormal. Unfortunately, owing to lack of facilities, the electrical reactions of the muscles could not be tested at this stage. By March 10 the pain was much less, though present on deep palpation, and the temperature was normal, but the deltoid paresis was unchanged, except for slight return of power in the anterior fibres. The right triceps jerk was diminished, but no other nervous lesion was detected; the optic fundi appeared normal. Subsequently the pain gradually decreased and the paralysis improved slightly. On March 24 he was sent home with instructions to attend as an outpatient at a general hospital for physiotherapy, where, on examination, the muscles were found still to respond to faradism. When seen again on May 4 he had some weakness and wasting, but muscular power was returning and the electrical reactions were normal.

Case II

A plumber aged 56 was admitted to the Grove Hospital on May 5, 1938, with a well-marked attack of scarlet fever. Previously he had always been healthy and there was no history of allergic manifestations. He was given 20 c.cm. of scarlatinal antitoxin intramuscularly, and he made excellent progress for six days, after which he collapsed and vomited with the onset of a serum rash. He recovered, and the following day there was glycosuria. On the eighth day after serum administration severe generalized urticaria was present, and the same afternoon he complained of occipital headache and appeared drowsy and mildly confused. On examination there was strabismus due to paralysis of the right external rectus muscle, nystagmus, and some weakness of the right side of the face; but the pupils reacted normally and the ocular fields were full, though the edges of the optic disks appeared blurred. Voluntary power, tendon reflexes, and plantar responses showed no abnormality. The abdominal reflexes were absent, there were no cerebellar signs or spasticity, but doubtful right ankle-clonus was noted. The patient did, in addition, exhibit a definite right hemi-hyperaesthesia affecting the arm, leg, and trunk, but there was no astereognosis, aphasia, or other objective sensory change. Lumbar puncture yielded 20 c.cm. of blood-stained cerebrospinal fluid under pressure, analysis of which showed protein 200 mg. per 100 c.cm. with increased globulin, chlorides 789 mg. per 100 c.cm., sugar 60 mg. per 100 c.cm., and cells 180 per c.cm., of which 95 per cent. were neutrophil leucocytes and 5 per cent. lymphocytes, with numerous red blood cells. After injection of adrenaline and coramine he recovered rapidly, the headache disappearing with subsidence of the serum rash. The following day there was still slight squint, doubtful right ankle-clonus, and right hemi-hyperaesthesia, which was confirmed by the visiting neurologist. Twenty-four hours later the serum rash and all neurological signs had disappeared, and the patient, apart from some drowsiness and exhaustion, seemed completely recovered. He was allowed up on May 23, and was discharged home quite well on June 10.

Discussion

The first case conforms in the main to the usual peripheral type of nervous lesion. It has, however, a feature of special interest—namely, the pain on the eighth day occurring in place of and not along with the serum rash, and preceding by a long interval the onset of paralysis accompanied by general reaction. The absence of urticaria may cast doubt upon the diagnosis, but the time of onset of the pain and the lack of any further cause appear to be conclusive, a point which has been noted in other reported cases.

With regard to the second case, the age of the patient and the changes in the cerebrospinal fluid suggested at the time an alternative diagnosis of cerebral thrombosis or some other acute meningo-vascular disturbance. The sudden onset of neurological signs, coincident with the onset of serum disease, and the rapid recovery with disappearance of the serum rash, are characteristic of such rare cases, however, and were considered to be sufficiently conclusive.

Although the pathogenesis of serum neuritis and other nervous complications of serum therapy has given rise to much conjecture its exact aetiology remains obscure. Among various theories of origin, the one now generally favoured supposes that a perineural oedema, comparable to the oedema of serum disease, causes a compression or ischaemic paralysis of nerve trunks. Other theories have suggested direct toxin action on the nervous system, affecting nerves of low chronaxie, as in lead poisoning, or a perivascular infiltration with widespread capillary haemorrhages in brain and spinal cord, such as has been found experimentally in acute anaphylaxis.

A high percentage of the recorded cases have followed the injection of tetanus antitoxin, but this may be accounted for by its frequent use as a prophylactic agent. Certain other factors—such as the age of the serum, degree of refinement (we have not been able to trace any reference to nervous complications after the use of crude horse serum), and sensitization of the patient by a previous administration of serum—may be of aetiological importance.

Though recovery may take several months the ultimate prognosis in the majority of cases appears to be good. According to Bennett (1939), however, about 20 per cent. of cases are left with a varying degree of disability. Nevertheless, in view of the great rarity of such manifestations the consensus of opinion is that the remote possibility of this occurrence should not affect the employment of one of our most valuable therapeutic measures.

Summary

Involvement of the nervous system as a complication of serum therapy is discussed.

Two cases showing symptoms referred to the nervous system following the injection of anti-scarlatinal serum are recorded.

Theories of the origin of the nervous complications are reviewed.

The prognosis in the majority of cases appears to be good.

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REFERENCES

Allen, I. M. (1931). *Lancet*, **2**, 1128.
Bennett, A. E. (1939). *J. Amer. med. Ass.*, **112**, 590.
Bineau, R. (1938). *Thèse Paris*, No. 424.
Dyke, S. C. (1918). *Lancet*, **1**, 570.
Kraus, W. M., and Chancy, L. B. (1937). *Arch. Neurol. Psychiat.*, Chicago, **37**, 1035.
Lhermitte, J. (1919). *Rev. Neurol.*, **26**, 894.
—— (1938). Ibid., **69**, 375.
Smith, R. E. (1939). *Lancet*, **2**, 1119.
Thaon, P. (1910). *Sem. méd.*, Paris, **30**, 513.

LOCAL TREATMENT WITH PRONTOSIL SOLUBLE

BY

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The value of local treatment with chemotherapeutic drugs is still unsettled, but if the method proves satisfactory it will have the obvious advantages of economy and atoxicity. The result of using prontosil soluble locally in one case was so striking that the procedure was tried in a variety of conditions. Five of these cases are reported below.

Case Reports

Case 1.—A young woman who was admitted to hospital with lobar pneumonia developed a pneumococcal empyema which drained for over four months, about 60 oz. of thick greenish pus being discharged in the twenty-four hours. Her general condition was poor, and nursing was rendered difficult because of marked oedema extending from the lower costal margin to the feet. As the condition did not respond to the usual method of treatment 5 c.cm. of 5 per cent. prontosil soluble was injected into the pleural cavity; the next day the discharge was very much thinner and contained only flakes of pus. Twenty-four hours after the second injection, given on the third day of treatment, the drainage was much less, there was no frank pus, and the fluid was sterile on culture. A third injection was given on the fifth day; the discharge from the pleural cavity rapidly diminished and the oedema began to recede. A fortnight after starting treatment the tube was removed. The patient rapidly regained her health, and four weeks later she was discharged from hospital fully recovered.

Case 2.—A middle-aged female melancholiac in poor physical condition developed an abscess in the gluteal region to the left of the sacrum. Following treatment with fomentations a cavity large enough to hold a tennis ball was discovered. This appeared to be walled off by gangrenous muscle, while the discharge consisted of foul-smelling greenish-black pus containing strips of necrotic tissue. Treatment with eusol packings over a period of a week produced no improvement. The cavity was then packed with gauze soaked in prontosil soluble. Within twenty-four hours the foul odour had practically disappeared and the wound was remarkably clean. The cavity now rapidly filled with healthy granulation tissue, and epithelium started growing at the edge. Three weeks after the first treatment with prontosil soluble the wound was completely healed and was covered with healthy skin.

Case 3.—This patient, a female, suffered from a varicose ulcer four inches in diameter on the outer aspect of the right leg; it had resisted all attempts at treatment. The discharge was copious, and each dressing was filthy when removed. An ointment containing 5 c.cm. of prontosil soluble to the ounce of lanolin was prepared, and was applied to the ulcer once daily. The odour disappeared in twenty-four hours; healthy epithelium began to invade the raw surface, and in four weeks the ulcer had healed completely and was covered with healthy skin.

Case 4.—A female mental defective, this patient complained of pain in the anal region, and on examination a perineal ulcer about the size of a five-shilling piece was discovered.

The anal mucous membrane and the skin of the outer edge of the ulcer were undermined, and the odour was extremely unpleasant. The condition rapidly became worse during treatment with eusol dressings: the surrounding skin broke down to a distance of two inches from the margin of the anus, the perineum was denuded of skin, and the ulcer extended to the posterior vaginal wall. The patient became incontinent and her temperature rose to 102°. Treatment with proseptasine, one tablet (0.5 gramme) thrice daily, had to be stopped on the third day owing to vomiting. A culture from the ulcer revealed a very mixed infection in which *B. coli* predominated. On the eighth evening prontosil ointment was applied, and the next morning the temperature dropped suddenly, the ulcer was cleaner, and the odour had disappeared. After three weeks' treatment with prontosil ointment the wound was completely healed and was covered with normal skin.

Case 5.—This patient had had both her breasts destroyed when she was severely burned in September, 1937; her neck and right arm were also involved. Examination in January, 1939, disclosed a large raw surface on the chest, neck, and arms. Some degree of healing had taken place, but the wound appeared to be sluggish and unhealthy. The granulation tissue was inactive, and the skin showed no signs of growing over the area. The patient was admitted to hospital, and the original treatment—vaselin gauze—was continued for one week. As there was no improvement prontosil ointment was applied. The odour which had been present now disappeared, the wound showed rapid improvement, and epithelium began to invade the raw surface. The area is not completely covered, but remarkable progress has been made in the ensuing six weeks, and the remaining raw surface is about four square inches. The patient should soon have completely recovered.

Discussion

In view of the widespread interest in chemotherapy it is rather surprising that the local use of these drugs has excited so little attention. Thus of the innumerable publications on chemotherapy only a handful refer to local treatment, although some good results have been reported. Tiling (1936) successfully treated cases of streptococcal empyema with intrapleural injections of prontosil soluble, and numerous workers have given prontosil soluble or sulphanilamide intrathecally in meningitis, along with oral or parenteral administration. Jaeger (1936) and Merz (1937) claimed good results in the local treatment of certain skin diseases with prontosil, while Bosse and Bosse (1939) treated purulent cavities, burns, and varicose ulcers with applications and packings of prontosil dispensed in different ways. Schlenker (1938) also described rapid improvement following intrapleural injections of prontosil soluble in empyema, and Childrey (1939) used the same drug for irrigation treatment of resistant sinus infections. An interesting application of this method has been reported by Jensen, Johnsrud, and Nelson (1939), who packed the cavities of compound fractures with solid sulphanilamide.

It is difficult to explain the action of prontosil soluble applied locally, as the drug has no direct antiseptic effect and the content of active substance is very low. It may be concluded, however, from the results described above (and achieved in twenty-five other cases) and from the literature that prontosil soluble has a powerful antibacterial effect when in contact with infected tissues. This treatment may be of great value in war wounds and injuries, all of which are certain to be contaminated. A striking feature of this treatment is the deodorant and stimulating action of the compound, an effect which may be produced by the dye substance contained in prontosil soluble, and it should be noted that no toxic effects were observed.

Summary

Successful local treatment with prontosil soluble in empyema, ulcers, abscesses, and other conditions is described. The drug has anti-bacterial, deodorant, and stimulating action in such cases, and toxic effects do not occur.

I should like to express my thanks to Dr. A. Shepherd for his helpful suggestions and permission to publish this article. I am also grateful for the kind co-operation and criticism of many who must remain anonymous.

REFERENCES

Bosse, P., and Bosse, G. (1939). *Fortschr. Ther.*, **15**, 202.
Childrey, J. H. (1939). *Arch. Otolaryng.*, **29**, 986.
Jaeger, K. (1936). *Dtsch. med. Wschr.*, **62**, 1831.
Jensen, N. K., Johnsrud, L. W., and Nelson, M. C. (1939). *Surgery*, **6**, 1.
Merz, H. (1937). *Schweiz. med. Wschr.*, **67**, 342.
Schlenker, L. (1938). *Bull. St. Louis med. Soc.*, **33**, 44.
Tiling, B. (1936). *Münch. med. Wschr.*, **83**, 952.

Clinical Memoranda

Progesterone and Vitamin E Treatment during Pregnancy

The case here reported raises the question whether any hormone or other insufficiency can be considered partly responsible for the long sterility followed by a malpresentation and a placenta praevia. The first normal pregnancy and labour certainly followed the use of progestin; a subsequent untreated pregnancy ended in abortion, and even after the successful fifth pregnancy lactation could not be normally established. The case suggests that the combination of progesterone and vitamin E may be worth a trial in patients with similar bad obstetric histories.

Case History

Following ten years of marriage and sterility the patient underwent dilatation, curettage, and carbolization, and her first pregnancy began soon after. Both she and her husband had been extremely desirous of having a child.

First Pregnancy.—The patient, aged 33, was delivered of a full-term dead child. The labour was difficult, the presenting part being a breech, with extended legs; the arms also were extended. Scopolamine and morphine were used. During and after the confinement the mother was physically quite well, and at no time were the kidneys functioning abnormally.

Second Pregnancy.—The patient became pregnant about a year later. At the seventh month a placenta praevia was discovered. The child was born dead.

Third Pregnancy.—Throughout this pregnancy, which occurred in 1937, progestin was given in 1-mg. doses at weekly intervals. The patient was made to rest for several days each month at times of the usual periods. At no time was anything physically wrong discovered in her. One month before the expected date of delivery she was examined radiologically to find the exact position and lie of the child. The report was as follows: "This reveals a normal pregnancy lying in vertex presentation and in the right occipito-anterior position. The head has not yet entered the pelvic brim, but the relative size of the head and the maternal pelvis appears satisfactory so far as one can judge from the radiograph. The development of foetal bones indicates that the pregnancy is of about thirty-four weeks' duration. The whole general appearance is very satisfactory from the point of view of the *x*-ray findings." A month later the mother was delivered of what appeared to be a normal child. The labour was straightforward and rapid. Pains were almost absent, and scopolamine and morphine were used. About four weeks later the child began to regurgitate its feeds and lose weight. In hospital an *x*-ray examination showed the presence of pyloric stenosis. Medical treatment was tried for a week without avail.

Operation was then performed, and the child died exactly a week later.

Fourth Pregnancy.—This began towards the end of 1938. No progestin or other hormone was given in this case. Everything was allowed to run a natural course. At the end of the third month the patient had an inevitable abortion. A few weeks later a dilatation and curettage was performed and the uterine scrapings were examined. The report was as follows: "Three minute soft white flattened irregular fragments of tissue. Microscopical examination—the tissue is small and much fragmented. There is no evidence of pathological change."

Fifth Pregnancy.—The patient, now aged 38, became pregnant for the fifth time in 1939. Labour was expected in November. On the advice of a gynaecologist she was given 2 mg. of progesterone (Schering Ltd.) twice weekly and two capsules of fertilol (Vitamins Ltd.) each night. In September she was evacuated to Scotland. Treatment with progesterone and fertilol was continued up to term in November. The patient was sent into a nursing home a week before the child was born. She was fit and bright, though the baby, by abdominal examination, seemed a trifle high. Slight pains started at 6 a.m. on November 10, but did not become severe until the afternoon. Shortly after 3 p.m. the cervix was fully dilated. The membranes were forcibly ruptured and the head, which was still fairly high, came well down in an occipito-posterior position. The patient's pains were good, and, under light chloroform, the head came down on to the perineum without rotating. Forceps were applied and a live healthy child was delivered as a persistent occipito-posterior. There seemed to be less risk that way than to attempt version. A short episiotomy was required; this was repaired with catgut and two silkworm-gut sutures. The baby weighed 8¼ lb. After two days of breast-feeding the baby had lost 4 oz., and as there was no sign of a sufficient milk supply being established artificial feeding was begun. At the end of the week the baby had gained 1 oz. on his birth weight. The mother progressed uneventfully. Six months later both mother and child were fit and well.

Manchester, 16. HUGH MACCALLUM, M.B., Ch.B.

Spontaneous Rupture of Tendon of Long Head of Biceps

The method of suture of the long head of the biceps after a spontaneous rupture described in the following case has not, so far as is known, been previously reported. It is a very simple procedure and only involves the making of two small incisions. The tendon is restored to its original alignment and is attached to the upper part of the bicipital groove without disturbing the insertion of the pectoralis major muscle. The cosmetic and functional results are encouraging and appear to be a definite improvement over other forms of treatment.

CASE REPORT

On November 14, 1939, a boot-and-shoe polisher aged 65, while putting some coal on the fire, experienced a sudden "strike" in his right shoulder and his "muscle slipped down to the bend in his arm." He had previously had occasional vague pains in this shoulder on abduction and when reaching for an object.

Examination revealed gross bunching of the long head of the biceps muscle in the middle of the upper arm that was increased by active flexion. Power of flexion was greatly diminished, and there was tenderness in front of the shoulder just over the bicipital notch (that is, the space between the lesser and the greater tuberosity at the upper part of the bicipital groove).

In view of the almost spontaneous nature of the rupture, the tenderness over the bicipital notch, and the history of previous shoulder trouble, a supraspinatus tendon lesion was considered as a predisposing cause, especially as such a lesion commonly leads to degenerative changes in the region of the bicipital notch. It was also appreciated from past experience that in spontaneous rupture of the biceps the long tendon is usually involved at the bicipital notch, where it changes its direction and frictional factors are at a maximum. Consequently, a variation from the usual operative technique was introduced.

OPERATION

A preliminary incision two inches long was made in front of the shoulder extending downwards from the acromio-clavicular joint, similar to that used for exposure of the supraspinatus tendon. Separation of the anterior fibres of the deltoid muscle revealed the subdeltoid (subacromial) bursa, which was observed to have a very thin floor; it was so thin that the bicipital notch could be seen through it. No obvious tear of the supraspinatus was seen, however, although this transparency was taken to indicate gross attenuation of the musculo-tendinous cuff.

On incising this thin sheet of tissue the bicipital notch was fully exposed, and no trace of either end of the tendon of the biceps could be found in the groove or shoulder-joint. A second lower incision was then made exposing the upper end of the belly of the biceps just below the lower edge of the pectoralis major muscle. On passing a probe down the bicipital groove, from the first incision towards the lower one, the distal end of the ruptured tendon was pushed in front of it and could thus be attached to the probe (working through the lower incision) and drawn up the groove again without dividing the pectoralis major muscle at all.

At its extreme upper end the tendon was seen to be enlarged and oedematous, but it was found on flexing the forearm to 60 degrees that this upper half-inch could be sacrificed and an almost normal portion of the tendon used for suture to the lips of the groove just below the notch. Thread was used for this purpose, and all bunching and irregularity were carefully avoided so as not to interfere with abduction of the shoulder later.

On inspecting the arm there was a complete restitution of the muscle to a normal appearance, and the forearm could be extended safely to 90 degrees without unduly straining the sutures. The wounds were then closed, a large wool pad was placed in the axilla, and the arm bandaged so that the elbow was kept flexed at 60 degrees.

Ten days after operation the sutures were removed: the wounds were soundly healed, and active movements were started. Twenty-one days after operation the elbow movements were full and flexion power was fairly strong; shoulder abduction was up to 150 degrees. Forty days after operation the elbow movements were full and as strong as the other side, and the appearance of the biceps muscle was normal. The shoulder movements were absolutely full. There were no symptoms at all.

The chances of recurrence of the rupture after this operation are probably very small because the point of maximal friction at the bicipital notch has been eliminated.

COMPARISON WITH OTHER FORMS OF TREATMENT

The Old Method of Suture.—This was usually performed through an incision over the ruptured muscle itself, which was sutured up as high as possible under the pectoralis major muscle, and resulted in an improvement in the appearance of the arm, but there was little gain in function. Sometimes part of the insertion of the pectoralis major was divided, a step which transferred the operation from a constructive into a destructive procedure.

Conservative Treatment.—This was probably the sounder form of treatment because it gave results as good as, and sometimes better than, suture by the old method, and, of course, avoided an anaesthetic in a patient who was usually middle-aged. With conservative treatment, however, the return of muscular power was only about 70 per cent. and the cosmetic effect was poor.

Norwich. G. K. MCKEE, F.R.C.S.

Reviews

MODERN TRENDS IN OPHTHALMOLOGY

Modern Trends in Ophthalmology. Edited by Frederick Ridley and Arnold Sorsby. (Pp. 699; 271 illustrations and 8 colour plates. 30s. net, postage extra.) London: Butterworth and Co. (Publishers), Ltd. 1940.

This is a most striking and valuable piece of work. It reflects great credit upon the understanding, industry, and intense activity of the editors, Mr. Frederick Ridley and Mr. Arnold Sorsby, and on the judgment they have displayed in the choice of the many authors of the several chapters of the book. The editors rightly state that clinical practice occupies a position in between the systematized knowledge (and some venerable fallacies) enshrined in the textbooks and the ferment found in the periodical literature. The aim of the editors has been to secure articles upon selected subjects by ophthalmologists all over the world who have shown by their work that they are real pioneers in some particular line of investigation or treatment. They have endeavoured to obtain for their readers such a collection of articles as will display the anticipated or promised advances of these pioneer labours. There can be no doubt that the aim the editors had in mind in the production of this work has been attained. They have gathered a most stimulating series of records from three continents, and from no fewer than fifty-five contributors.

The contents are grouped in seven parts: I, Ophthalmology in relation to general medicine; II, Diagnostic procedures; III, Refraction and binocular vision; IV, Physiology of vision; V, Some newer conceptions in pathology; VI, Treatment; VII, Social aspects. The high degree of observation and judgment shown in the many chapters makes a reviewer hesitate to pick out any of them as of particular interest, since such a selection might be thought to suggest that those not mentioned are of lesser value. But there can be no selection in that sense. There is no chapter which is without its particular interest. Some will appeal more to one reader than to another, just because of his own concern in that subject. So with a reviewer. Chapter 1, on allergy and immunity in ophthalmology, by Professor Alan C. Woods of Baltimore, makes a strong impression because of the clearness of exposition of a very difficult and complicated subject. Chapter 9, on heredity in eye diseases, by P. J. Waardenburg of Utrecht, gives an excellent account of that most fascinating study of heredity in which ophthalmology furnishes examples of dominant sex-inherited characters that are extremely rare in human genetics. The chapter is an admirable and advanced introduction to what has proved to be a fascinating retreat and relaxation for many ophthalmologists. On the other hand, Chapter 15, on the light sense, by Messrs. C. E. Ferree and G. Rand of Baltimore, gives an enlivening account of that sense which is the foundation of all visual response, and one which is most pertinent to present-day war conditions, among both the civil populations and the armed forces. The great difficulty of analysing this basic power is clearly shown. Chapter 28, on contact glasses, by P. F. X. Thier of Utrecht, is brief but to the point. The brilliant successes of these lenses in a relatively limited field have led the laity to believe that they were a cure-all, with the risk of their discredit. Their real value is well set out. Perhaps the chapters that will attract most attention in these days of world war are Chapters 54, 55, and 56: ophthalmology in aviation, by P. C. Livingston of the Royal Air Force; prevention of industrial ocular injuries, by Harry Vanderbilt Würdemann and Francis A. Brugman of Washington; and chemical warfare in relation to ophthalmology, by L. T. Poole of the Royal Army Medical College, London.

This book is without doubt a first-class production. It reflects the highest credit upon the editors, the contributors, and also the publishers. It will be of great service to English-speaking ophthalmologists everywhere. One can only regret that so valuable a work should have come to birth in these sorry and disturbing days of world war. It deserves to have come forth in days of peace, when its study would for certain have been extensive.

A TEXTBOOK OF PSYCHIATRY

A Textbook of Psychiatry for Students and Practitioners. By D. K. Henderson, M.D., F.R.F.P.S., F.R.C.P.Ed., and R. D. Gillespie, M.D., F.R.C.P., D.P.M. Fifth edition. (Pp. 660. 20s. net.) London: Oxford University Press.

The chief aim of "Henderson and Gillespie" has always been to present psychiatry as a living subject, related to the social problems of everyday life. The authors are impressed by the biological hypothesis of Adolf Meyer and the American school that mental illness is the cumulative result of unhealthy reactions of the individual mind to its environment. They also believe that mental illness should now no longer be regarded as the mysterious preserve of a few specialists, but that a working knowledge of psychiatry is within easy reach of the general practitioner. They follow the excellent American practice of giving copious data about individual patients. As they maintain, mental illness is an individual affair and its symptoms have little meaning apart from their setting. What is always wanted is an understanding of the patient as a human being, and of the problems which he is meeting in a morbid way with his symptoms. For the same reason they do not give a very comprehensive list of references, as would be fitting in a textbook on physical disease.

Their first edition appeared in 1927, and the appeal which their dynamic attitude has made to psychiatrists is illustrated by the short intervals at which successive editions have been called for. In publishing a fifth edition the authors say that their object is to keep abreast of the times. They have selected what has seemed to them most pertinent in the rapidly accumulating stock of new psychiatric material. For instance, they have reviewed in considerable detail the insulin treatment introduced by Sakel and the cardiazol treatment introduced by Meduna. They have taken the chapter on psychopathic states out of the section on mental deficiency and rewritten it almost entirely, with the object of giving it clearer definition and drawing greater attention to it. They have paid particular attention to Gjessing's investigations into the metabolism of stuporose patients, added extensively to their discussion of hereditary factors, and amplified the section on the treatment of nervous children by means of play therapy. They have also given further data on prognosis and have surveyed the principal advances in what they consider to be unfortunately named "psychosomatic" medicine.

As might be expected in a book partly written by so eminent an expert witness as Dr. Gillespie, the section on the relations of psychiatry and law is practical and thorough. Moreover, as the authors are both Scottish, they have been well able to state the Scots as well as the English law. They outline the chief points which the doctor should bear in mind when he certifies a patient, and the procedure for the admission of a patient to an

institution in England, Scotland, and the United States. They deal accurately with the new Divorce Act, but references to important decided cases, such as Shipman v. Shipman, would have been valuable. They expose the chief difficulties which arise in determining whether a person accused of crime is irresponsible because of mental disorder, and set out some restrained and valuable criticism of the M'Naghten rules.

HOMANS'S TEXTBOOK OF SURGERY

A Textbook of Surgery. By John Homans, M.D. With a Special Bibliographical Index and with illustrations by W. C. Shepard. Fifth edition. (Pp. 1,272; 530 illustrations. $8.00.) Springfield, Illinois, and Baltimore, Maryland: Charles C. Thomas. Orders may be addressed to 220, East Monroe Street, Springfield, Illinois, or through any bookseller.

A fifth edition of the well-known textbook by the professor of clinical surgery at Harvard is welcome, but from among the list of his collaborators from whose lectures and other writings the work has been compiled we have to deplore the recent loss of Harvey Cushing, who died in October last. The volume is beautifully published, in clear type on thin Lexington paper, which enables some 1,280 pages to be included in a volume which is readily handled without any suggestion of unwieldiness. The illustrations are black-and-white line drawings, and these, like the text, are very clear and pleasing; our only criticism is that we should have welcomed still more of them. Revision for this edition has been thorough, and the work remains singularly complete for a single textbook, chapters on the eye, the ear, the nose, accessory sinuses, and pharynx, on plastic surgery, gynaecology, and anaesthesia being included, while parts of the text are devoted to neurosurgery and orthopaedics also. A casual reader who opens this book expecting to find just another students' textbook of surgery will be surprised and delighted both with its scope and its high standards. A better title as more indicative of its scope might be, "A Complete Practice of Surgery," or "Surgery—General and Special." Most of the recent references are American, and the work retains its individuality as a product of Harvard. The historical approach to the consideration of a particular subject adds to its appeal, and we foresee an even wider circulation for the present edition than the book has had in the past. No teacher of surgery should be without a copy—a brief glance through a chapter in preparation for a discourse on the subject referred to will almost certainly provide him with some new point of view from which his talk will prove the more attractive to his students.

SURFACE MARKINGS

Landmarks and Surface Markings of the Human Body. By L. Bathe Rawling, M.B., B.Ch., F.R.C.S. Eighth edition (new terminology). (Pp. 98; 36 illustrations. 8s. 6d. net.) London: H. K. Lewis and Co. 1940.

It was with regret that we had to record a few weeks ago the sudden death of Mr. L. B. Rawling shortly after the publication of the eighth edition of his well-known *Landmarks and Surface Markings of the Human Body*. This edition differs from the earlier by the substitution of the revised British nomenclature for the older terminology. Certain amendments have also been introduced by Dr. J. M. Mungavin, who has revised the proofs, but the book still retains its original characters—namely, lucidity, brevity, and didactic statement.

Opinions may differ as to whether it is desirable to adopt a simple dogmatic method of teaching "surface markings" for examination purposes, but the demand for this book leaves no doubt about the popularity of such teaching among students who prefer a single concise statement to a more detailed and complete description which takes into consideration variations due to age, sex, position, the empty or full condition of a hollow viscus, and other factors which may alter the position of a particular part or organ relative to the surface.

Figure 25 in the new edition is in some ways an improvement on the corresponding figure in older editions, but the course of the tendon of the flexor digitorum longus, which is shown lying beneath the medial cuneiform bone and the first metatarsal, gives an incorrect impression, and the illustration gives no indication of this tendon passing beneath that of the flexor hallucis longus to reach the central part of the sole. Moreover, by a misprint in the caption to Figure 25, left foot 5, the projection on the medial side of the calcaneum is described as the "Sustentaculum stali." Further, in Figure **7**, 9, the transverse plane passing between the highest points of the two iliac crests, or "interiliac plane," is incorrectly described as "transtubercular," which plane, also called "intertubercular," corresponds to the level of the fifth lumbar vertebra and lies considerably below the level of the "interiliac plane." This latter name, which was correctly employed in the earlier editions of the book, indicates the level of the lower part of the body of the fourth lumbar vertebra, and also the normal level of the bifurcation of the abdominal aorta.

POPULATION

Population. A Problem for Democracy. By Gunnar Myrdal. The Godwin Lectures, 1938. (Pp. 237. 11s. 6d. net; $2.00.) Massachusetts: Harvard University Press; London: Oxford University Press. 1940.

These lectures delivered at Harvard University in 1938 are less statistical than books on population problems are apt to be, mainly because the Lecture Trust provides that the subject shall be "The Essentials of Free Government and the Duties of the Citizen," partly, perhaps, because Professor Myrdal does not approve of statisticians—as a foolish sneer at Professor Raymond Pearl's researches (on p. 27) implies.

Professor Myrdal uses the experience of Sweden as a kind of laboratory experiment in the reaction of a democracy to the problems of population. He is a dull writer, but the information he provides is interesting. We must remember, he writes, "the democratic structure of a country like Sweden, with democratic principles penetrating deeply the whole outlook on life, and, further, the intensive popular education spreading, with the support of the State, hygienic and cultural ideals in regard to what constitutes a decent standard of living, a standard which for the majority of families is clearly incompatible with having and rearing a normal number of children." He holds that to maintain population (in Sweden) a majority of non-sterile marriages must produce four children, and that such a population policy will not be followed without vast distributional reforms—"reforms so radical that public opinion at present is certainly not prepared to accept more than a small fraction of them at most." Professor Myrdal strongly urges that the subject belongs to social science, and he accuses men of science of regarding constructive technical planning for social change as unworthy of their attention. "If they [the scientists] find their work difficult in the face of a society which does not accept their aid or find themselves untrained for the task, it is a poor escape to rationalize this situation into contempt for the important part of statesmanship which rightly belongs to

practical social science." This quotation illustrates the weakness of Professor Myrdal's logic. If, in fact, the public and their leaders reject the aid of a man of science it is plainly his duty to use his skill and knowledge where it *is* useful, and whether he regards politicians and their work with contempt or not is a matter of no importance, since, by hypothesis, his opinion is not valued. Professor Myrdal lays down the following premises:

(1) That a redistribution of total income resources in a population to the advantage of children should be effected.
(2) That quality of population should be considered in addition to and above quality.
(3) That population policy should be incorporated in the transformation of social policy from curative and symptomatic to preventive and prophylactic.
(4) That the measures shall be rationally integrated in a planned national economic policy.

None of these propositions is novel, and it cannot be said that he offers any solution of the difficulties involved in a deduction from them of practicable policies, but he has given illustrations of the dangers inherent in the present system, or want of system. Such would probably have been the conclusion drawn by a reader in quiet times. Now, when the very existence of democracy on the Continent of Europe trembles in the balance, the dangers of a future generation do not seem real. Professor Myrdal may find more attentive readers in the United States.

Notes on Books

The fourth edition of *Die Grundlagen unserer Ernährung und unseres Stoffwechsels*, by EMIL ABDERHALDEN, is a review of our present knowledge of the principles of nutrition and metabolism of the animal body. It deals with the functions of different kinds of foods, the biological values of different proteins, the importance of the vitamins and mineral constituents, the processes of digestion, and the fate of the foodstuffs carried to the body cells. It ends with a chapter of practical help for the more efficient feeding of a nation in time of war—a plea for more allotment gardens for growing protective foods, a plea for giving to the babies and growing children whatever milk and butter may be available, etc. In fact, it is a book based on sound knowledge and sound common sense.

Dr. EDGAR WHITAKER has occupied his leisure in writing a book, *The Ear and its Diseases*, which gives an account in simple language of the essential points in the anatomy and physiology of the ear and the minor maladies which affect it, in order that those interested in hearing, whether they be parents or potential patients, may have some reliable guide. The author has succeeded well enough in the purpose which he claims, though the price (7s. 6d.) for a popular book of this kind seems rather high. A useful feature is the description of hearing aids and their construction by Mr. Barnard Way. The mechanism and physical properties of these instruments are often taken for granted, and it is rare to find any intelligible account of how they work even in quite elaborate articles on hearing aids for the deaf. Any help for the deaf is welcome, and Dr. Whitaker points the way towards a sympathetic understanding of their difficulties. The book is published by J. Whitaker and Sons, Ltd.

The nineteenth issue of *L'Année Médicale Pratique* strikes a sombre note, for its indefatigable editor, Professor CAMILLE LIAN, is now "médecin-capitaine," and most of the contributors have a military title. Nevertheless the literature (almost entirely French) has been graded and annotated for its practical value, and from tonsillar abscess to acute infections of the urinary passages (A to V in the French nomenclature) over 400 pages of text are packed with useful information. The publisher is René Lépine of Paris and the price 36 francs.

Preparations and Appliances

IMPROVED ETHER MASK

Dr. BARNET SOLOMONS (London, N.W.8) writes:

For many years I have used Denis Browne's "tin hat" anaesthetic mask for administering ether, ethyl chloride, and vinesthene. It gives an economy of some 60 per cent. to 80 per cent. of ether compared with the Schimmelbusch type, and also, at need, a much stronger vapour. It has, however, two disadvantages: first, the face-piece is not adjustable to different sizes of faces, and, secondly, the mask remains efficient only when it is held vertically.

I have designed a mask which overcomes these drawbacks. A new type of universal joint (which permits easy adjustment and locking at any desired angle) connects a vaporizing chamber with a standard fitting for gas face-pieces of any size. The chamber itself is cylindrical, but retains the essential feature of the original "tin hat," in which the

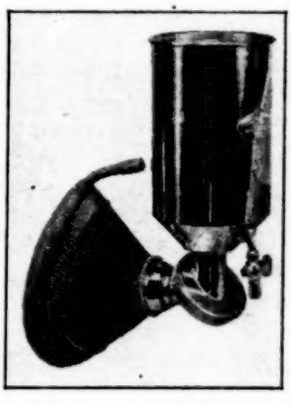

FIG. 1.

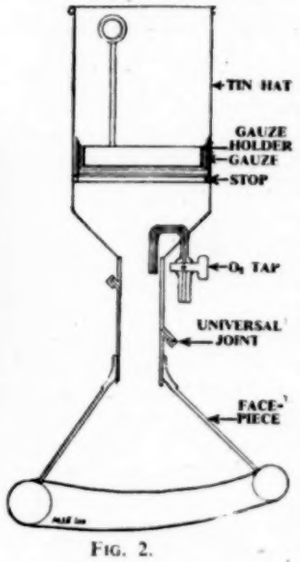

FIG. 2.

gauze is fixed by means of a simple metal ring with a central handle. In the new mask this handle is set eccentrically, so that it is out of the way of anaesthetic fluid dripping on to the gauze. By means of the universal joint the gauze surface can be kept horizontal in any position of the face-piece. An oxygen inlet and tap is connected to the lower conical end of the vaporizing chamber.

With this mask it is possible to anaesthetize the most resistant patient quickly and deeply with ether alone; and for this reason, as well as its great economy of anaesthetic agent, I would suggest that it may be of special use in war-time surgery.

I have shown the apparatus to Mr. Denis Browne, who gives it his unqualified approval, but asks me to emphasize once again that the difficulties with this type of mask are due invariably to using the quantity of ether customary with the Schimmelbusch type—that is to say, about four times too much.

The mask has been constructed for me by Medical and Industrial Equipment, Ltd., 12, New Cavendish Street, London, W.1, and I am indebted to Mr. H. Talley of this company for his helpful co-operation and technical advice.

MERSALYL

Hypoloid mersalyl (Burroughs Wellcome and Co.) is a preparation of a compound which is generally recognized as the most effective diuretic hitherto discovered. The drug was introduced originally under the proprietary name of salyrgan, and the name mersalyl has been adopted by our *Pharmacopoeia* (*B.P.* Add., 1936).

BRITISH MEDICAL JOURNAL
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SATURDAY JUNE 22 1940

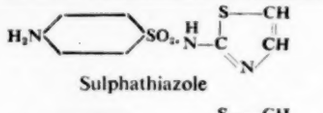
SULPHATHIAZOLE

The development of bacterial chemotherapy in the past five years is divisible into three stages, which succeeded the introduction respectively of prontosil, sulphanilamide, and sulphapyridine. During this time thousands of other such compounds have been synthesized and useful therapeutic actions have been claimed for some dozens of them, but for some time past there has been no outstanding advance such as would lead us to declare that a new stage has been reached in the progress of this treatment. To constitute such an advance a new compound must either embrace within the scope of its activity infections which have hitherto been resistant to such treatment, or it must exhibit some striking advantage such as a much lower toxicity in the treatment of infections already amenable. It has now to be considered whether either or both of these advantages have been secured in the new compound sulphathiazole*—2-(*p*-aminobenzenesulphonamido)thiazole or "M & B 760"—and its methylated derivative sulphamethylthiazole.† Although these compounds were first synthesized in this country, most of the published studies of their action have been made in the United States, and they have now reached a point at which provisional conclusions can be drawn.

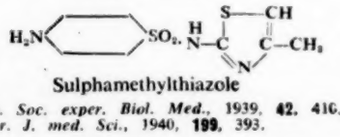
These drugs are more rapidly absorbed from the alimentary tract than is sulphapyridine and rather more rapidly excreted, a fact which gives emphasis to the need for frequent administration. According to H. B. van Dyke and his co-workers[1] sulphathiazole has only 65 per cent. of the gross toxicity of sulphapyridine; sulphamethylthiazole, on the other hand, is understood to be more toxic. The effects of therapeutic doses have been carefully observed in ninety-two patients by J. G. Reinhold, H. F. Flippin, and L. Schwartz,[2] and one important advantage of sulphathiazole over sulphapyridine is evidently a much less tendency to cause nausea and vomiting; only eight of these patients vomited at all. Almost equally valuable, should further experience bear it out, is the absence of cyanosis. The only organ which appears liable to suffer is the kidney; diminished renal excretion or haematuria occurred in several patients, and crystals of the drug were sometimes found in the urine. This disturbance of function was only transitory, but it evidently calls for further investigation. It is now well known that crystals of acetylsulphapyridine are liable to be deposited in the kidney and renal pelvis during sulphapyridine treatment, causing haematuria and even the formation of calculi, and although according to van Dyke and his colleagues the proportion of sulphathiazole which is conjugated is much lower, obstruction of the collecting tubules or ureter by crystals was found in some of his animals given large doses. Experimental evidence of therapeutic efficiency is furnished by C. M. McKee and others,[3] who adopted the method of feeding the drug as 1 per cent. of the diet to mice; it appears from their data that its action on pneumococcal infections and some others is about equal to that of sulphapyridine.

The principal interest in sulphathiazole centres on the possibility that it may prove capable of controlling infections by staphylococci, organisms which have so far effectively resisted chemotherapeutic attack. The experimental study of this type of infection is notoriously unsatisfactory, but the results of O. W. Barlow and E. Homburger[4] are at least encouraging; the life of mice inoculated with virulent staphylococci was considerably prolonged and the extent and number of the lesions diminished by treatment with either of the new compounds—sulphamethylthiazole appears to have been the more effective. The superiority of this compound in its action on staphylococci is also evident from *in vitro* observations quoted by W. E. Herrell and A. E. Brown;[5] it completely restrained the growth of these organisms in a mixture with broth, whereas the effects of sulphathiazole, sulphapyridine, and sulphanilamide were only partial.

Clinical evidence, it must at once be admitted, is not so far very encouraging. If further experience confirms that sulphathiazole is as effective as sulphapyridine for controlling infections by pneumococci it may well be used extensively merely because it is better tolerated. But this compound stands or falls as a major therapeutic advance by its effect on staphylococci. In one sphere the superiority of its action on these organisms appears to have been well established, and this is the urinary tract. Since sulphonamide compounds are wholly excreted in the urine they attain a much greater concentration there than in any other part of the body, and their action is hence seen at its best. The recent studies of H. F. Helmholz[6] make it clear that moderate doses of sulphathiazole will render the urine actively bactericidal for *Staphylococcus aureus* and for *Streptococcus faecalis*—two types of urinary infection which are resistant to other forms of sulphonamide treatment. The methyl derivative was the more effective against the second of these two; both compounds destroyed either of these cocci in concentrations inactive against various Gram-negative bacilli. Here, therefore, is a clear indication for the more effective treatment of coccal infections of the urinary tract, and some clinical confirmation is to be found in the observations of T. L. Pool and E. N. Cook.[7] In the much more difficult sphere of general-



Sulphathiazole

† 

Sulphamethylthiazole

[1] *Proc. Soc. exper. Biol. Med.*, 1939, **42**, 416.
[2] *Amer. J. med. Sci.*, 1940, **199**, 393.
[3] *Proc. Soc. exper. Biol. Med.*, 1939, **42**, 417.
[4] Ibid., 792.
[5] *Proc. Mayo Clin.*, 1939, **14**, 753.
[6] Ibid., 1940, **15**, 65.
[7] Ibid., 43.

ized staphylococcal infections the evidence is far less conclusive. One recovery from staphylococcal septicaemia is recorded by W. E. Herrell and A. E. Brown; it is perhaps noteworthy that this patient was given sulphamethylthiazole. Several speakers were able to add considerably to the bulk of available data on this subject at a meeting of the Section of Therapeutics and Pharmacology of the Royal Society of Medicine on June 11, a report of which appears on page 1032 of this issue. Taking all their results as a whole, it appears that sulphathiazole will usually control a localized staphylococcal infection such as carbuncle or osteomyelitis, the effect being often not merely distinct but rapid. On the other hand, among cases with proved septicaemia five deaths were recorded and only one recovery. Doubtless, as was remarked, some other cases had had a blood-stream infection, but there is all the difference between the transitory bacteriaemia by which metastatic abscesses can be produced and the continuous invasion of the blood which affords repeated positive blood cultures. Staphylococcal septicaemia is therefore probably still unconquered, but the timely administration of these new compounds may do much to prevent it, and they are certainly indicated in preference to other sulphonamide compounds for treating this type of infection at any stage.

BACILLARY DYSENTERY IN WAR

Few of those who in the last war served in the Middle East will need to be reminded of the importance of the dysenteries, and of bacillary dysentery in particular, as a cause of sickness and death in wartime. Rodenwaldt,[1] in discussing the problems which it raises, states that from 1914 to 1918 there were in the German Army more than 155,000 cases of dysentery, which, after influenza, was thus the most prevalent infectious disease. The importance of correct and early diagnosis also will hardly be forgotten. In the early days of the Gallipoli campaign, for instance, the indiscriminate administration of emetine to patients suffering from bacillary dysentery undoubtedly led to numerous fatalities. The outbreak of hostilities has again aroused interest in dysentery, both in this country and in Germany. In the autumn of last year some 300 cases of bacillary dysentery are said by Otto[2] to have occurred among German troops at Radom in Poland, in an area in which bacillary dysentery also occurred in 1915. Details of eighty-two cases of bacillary dysentery which arrived in Berlin from Poland are also given by Gantenberg.[3] Thirty-two cases were due to bacilli of the Shiga type, and of these seven patients died; twenty were due to Flexner type bacilli, and in thirty no pathogenic organisms were found. According to Otto complications were by no means uncommon; they included polyarthritis, parotitis, conjunctivitis, thrush, renal colic, icterus, bronchopneumonia, profuse bleeding from the intestines, and nervous symptoms such as paraesthesia.

[1] *Dtsch. med. Wschr.*, 1939, **65**, 1680.
[2] *Klin. Wschr.*, 1940, **19**, 241, 272.
[3] *Dtsch. med. Wschr.*, 1939, **65**, 1789, 1820.

In this country an important advance in our knowledge of bacillary dysentery has been made by more precise bacteriological classification. Dysentery bacilli, as is well known, belong to the non-lactose-fermenting or late-lactose-fermenting coliform bacilli, and are distinguished from the enteric organisms and the Salmonellas by the fact that they are non-motile and produce acid without gas in glucose. The dysentery group is itself divided into the non-mannitol and the mannitol-fermenting groups. The non-mannitol group is further subdivided into those that produce indol (*B. dysenteriae* Schmitz and *B. ambiguus*) and those that do not (*B. dysenteriae* Shiga). The mannitol-fermenting group consists of the late fermenters of lactose and saccharose, such as *B. dysenteriae* Sonne and *B. dispar*, and those that do not ferment lactose and saccharose—the Flexner dysentery bacilli. After the last war the Flexner group was carefully investigated by Andrewes and Inman,[4] who studied 200 strains, chiefly from the Near East and France, and divided them into five races—V, W, X, Y, and Z. Boyd,[5] as the result of prolonged researches carried out chiefly in India, has now shown that each of the races of Flexner bacilli does not, as was previously thought, contain a predominant quantity of a specific antigen and minor quantities of the specific antigens of the other races, but each possesses a distinctive specific or type antigen, while all share a common group antigen which is more complex than was originally supposed. The mannitol-fermenting dysentery bacilli can now in fact be divided into two groups: first, the true *B. dysenteriae* Flexner, comprising those races which possess Flexner group antigen; and, secondly, what it has been suggested should be called *B. dysenteriae* Boyd, embracing those pathogenic organisms that have the Flexner biochemical reactions but do not possess the group antigen. The more precise classification of the dysentery bacilli thus attained is not a purely academic question, for it is of importance in the production and early administration of type-specific sera. Hitherto the most satisfactory results have been obtained with anti-Shiga sera, but, as O'Brien[6] has pointed out, much of this serum has had only a low concentration of international units. But there is no reason why serum of 15,000 to 20,000 units per c.cm. should not be produced. No definite evidence is yet available of the value of anti-Flexner and anti-Sonne sera, and up to the present the sulphonamide group of drugs does not appear to have been used in the treatment of acute bacillary dysentery in man; but in mice infected with Flexner and Sonne bacilli there is a suggestion that sulphanilamide may be of value. Otto[2] found that blood transfusion brought about improvement in very acute cases. Much work has been carried out in an effort to make a prophylactic vaccine for bacillary dysentery as efficient as that in use against enteric infections. Prigge,[7] who in a limited number of experiments has obtained satisfactory immunity in man with formol toxoid, states that to be effective as a practical measure it would be essential to inject a vaccine containing a mixture of Shiga, Flexner, and Sonne antigens.

[4] Spec. Rep. Ser. Med. Res. Coun., 1919, No. 42. London.
[5] *Trans. roy. Soc. trop. Med. Hyg.*, 1940, **33**, 553.
[6] Ibid., 573.
[7] *Klin. Wschr.*, 1940, **19**, 337.

SILK FOR SUTURES

The use of ligature and suture materials in surgery is partly determined by custom and usage and partly by experience, and it does not follow that the most suitable and safest material necessarily remains the same at all stages of the development of surgical technique. During the Listerian era catgut was used almost exclusively on account of the infection and sinuses which followed the use of heavy grades of silk. Nevertheless, so experienced a surgeon as Kocher found that infection developed in 70 per cent. to 80 per cent. of his cases when catgut was employed, and considerable improvement followed the change over to fine silk. On the basis of Kocher's teaching, Halstead introduced silk into his clinic some time before 1883, about six years before the use of rubber gloves. Since then improvement in methods of sterilizing catgut and the general objection to the use of non-absorbable materials in surgery have led most surgeons to prefer catgut when it can be employed. Although ordinary methods of sterilizing catgut destroy the pyogenic cocci, they are not so effective against anaerobic and spore-bearing bacteria. Many independent workers have testified to this. A more critical review of the effects of catgut and silk on the healing of wounds has brought about a reorientation of ideas on the value of the latter. Three important recent papers[1 2 3] stress the advantages of silk in uninfected surgical wounds, and the following advantages are claimed for it. It is safe in much finer grades than is catgut; complete sterility can be obtained; the knots are much more secure than is the case with catgut; it is safer in the earlier stages of healing; the wounds show an increased healing per primam; there is a much reduced morbidity from wound infection and disruption; the patients are out of hospital earlier; and, finally, silk is much cheaper than catgut. These claims may sound extravagant, but recent work confirms them, and there is a much lower rate of non-suppurative complications and of both trivial and serious infections than after the use of catgut. Against these positive advantages there is no doubt that if infection should occur with silk the resulting extrusion or removal of ligatures or sutures is likely to be more troublesome than with catgut. Silk, however, must not be employed unless the surgeon is prepared to adapt his whole technique to the change in his suture material. As Whipple puts it, "The surgeon must adapt his team, instruments, and his entire technique to a more delicate medium, but not otherwise." If the advantages claimed for silk are to be achieved the silk used must be fine with not more than twice the tensile strength of the tissue into which it is inserted; light haemostats and fine needles are necessary; the smallest amount of tissue must be included in the suture or ligature; haemostasis must be perfect; there must be the minimal amount of tissue damage and the maintenance of the maximal amount of nutrition of the wound edges; all tissues must be protected as much as possible from soiling; and only interrupted sutures must be employed. Some writers also claim that the combination of catgut and silk is open to even greater objections than is the use of catgut alone. In the presence of actual infection or of conditions in which suppuration is likely to develop silk should be avoided, and many surgeons will certainly hesitate before putting it into the tissues of the alimentary tract. Silk, it is clear, possesses many advantages over catgut in the repair of clean surgical wounds, but a careful, painstaking, and often revised surgical technique is needed to gain these.

[1] *N.Y. State J. Med.*, 1939, **39**, 2011.
[2] *Surg. Gynec., Obstet.*, 1939, **69** (Int. Abstr.), 109.
[3] Ibid., 1939, **69**, 441.

IMPURITIES IN ANAESTHETIC ETHER

The revision of the Swedish *Pharmacopoeia* has revived the question of the importance of impurities in ethyl ether used for narcosis. Gisselsson and Lindgren[1] classify the disturbances of anaesthesia which are thought to result from the presence of acetaldehyde, vinyl alcohol, acetic acid, and peroxides—decomposition products easily formed in diethyl ether when stored—as (1) impeded anaesthesia; (2) certain respiratory and circulatory disturbances; (3) "ether convulsions"; and (4) post-narcotic pulmonary complications. They describe investigations into the influence of acetaldehyde in the first two groups; investigations in the other two will be reported later. It is pointed out that ether containing more than 0.5 per cent. of acetaldehyde is hardly ever used in practice as an inhalation anaesthetic. Experiments on mice, guinea-pigs, and rabbits showed no significant difference in "time to anaesthesia" between purified ether or the same ether to which 0.5 per cent. of acetaldehyde had just been added. When 1 per cent. of acetaldehyde was added this time was somewhat prolonged, and was appreciably prolonged with ether which had been allowed to stand for several days after the addition of even small quantities of aldehyde. Acetaldehyde greatly accelerates the autoxidation of ether. There was no disturbance of respiration in rabbits from ether containing 0.5 per cent. of acetaldehyde, but when it contained 1 per cent. the rate of respiration was higher and the volume of expired air reduced during the first fifteen minutes of induction and anaesthesia. It is suggested that the cause for this might be the retarded anaesthesia. Ether containing 1 per cent. of aldehyde was found to be no more deleterious to the isolated rabbit heart than was purified ether. In the intact animal ether containing 1 per cent. of aldehyde produced no greater change of rate and no greater changes of arterial and venous pressure than did purified ether. The small differences between the effects of pure ether and those of ether containing a much higher percentage of aldehyde than is likely ever to be found in anaesthetic ether are rather surprising, and the report on the influence of impurities on ether convulsions and on post-narcotic pulmonary complications will be eagerly awaited.

MEDULLOTROPHIC HORMONE BY MOUTH

The belief that pituitary extracts may be active by mouth has so far been chiefly confined to over-sanguine advertisers. The first claim to have demonstrated such oral activity in experimental animals has been made recently by Professor Collip[2] of Montreal. He was led to believe by certain, at present unspecified, clinical evidence that some pituitary extracts were effective by mouth and that their action was connected with the adrenals. He therefore gave hypophysectomized rats alcoholic extracts of the pituitary gland by injection and by mouth. The adrenals of the treated animals were examined by Dr. Selye, who reported that there was a definite hypertrophy of the "dark cells" of the medulla. These cells are amphophilic with a strong affinity for eosin. Their number was not found to be increased, but the increase in the cytoplasm was very marked. Corticotrophic extracts had no such effect; this was confirmed by the observation that the adrenal cortex of the treated hypophysectomized animals was normally atrophic.

[1] *Acta chir. scand.*, 1939, **83**, 45.
[2] *Canad. med. Ass. J.*, 1940, **42**, 2.

From clinical data it does not appear that the chromaffin system of the medulla was involved in any way. Collip then tried the effect of his extract on carbohydrate metabolism in both patients and experimental animals. He found[3] that oral administration of the extract reduced the nocturnal glycosuria of a diabetic maintained with insulin. Four cases of mild diabetes in which insulin was unnecessary were treated in similar fashion; in two of these there was a fall in the blood-sugar level. Two of four normal cases also showed some lowering of the blood sugar. Hypoglycaemic responses were also obtained in monkeys and rabbits but not in rats or a depancreatized monkey. In rabbits the extract also tends to raise the respiratory quotient. It is perhaps inevitable that these preliminary notes should be unsatisfactory. The experimental data given are sufficient to be interesting but not complete enough to be entirely convincing. As the author himself remarks, referring to the mild hypoglycaemia produced in monkeys and rabbits, "while fairly consistent [it] has not been remarkably striking, and indeed might be disregarded by some familiar with the possible vagaries of blood-sugar curves." He also refers to the finding of Blatherwick, Maxwell, and Long[4] that alcohol reduces the blood sugar. Professor Collip has used an alcohol-free extract for the animal experiments, but beyond this statement there is no detailed account of the chemical method of extraction. Control experiments in both human and animal experiments are scanty or absent. The theoretical importance of the finding is, of course, very great, and Professor Collip has propounded[5] a number of questions which will demand investigation. He rightly believes that when these questions are answered the mechanism controlling carbohydrate metabolism and diabetes may be much more clearly understood. At present, however, we await more detailed evidence of the primary activity of his extract before indulging in speculation.

A.R.P. IN GERMANY

Air raid precautions have been prominent in the minds of most citizens in this country, both lay and medical, for the last year or so. A long article by Professor Anschütz of Kiel[5] gives an interesting glimpse of the medical side of A.R.P. in Germany. Apparently the German plan is to transport the wounded in ambulances and other vehicles to stations in which a good deal of treatment may be done. "Rettungsstellen" seem to correspond to casualty clearing stations rather than to our conception of first-aid posts. When the vehicle arrives an "energetic and experienced" medical officer enters it and selects the cases which shall be treated at the post, leaving the others undisturbed to be taken to hospital. The facilities for operation are by no means equal to those in hospital, but they are much greater than we regard as desirable in this country. He prepares those who are to remain for treatment in the dressing-room or theatre. His is therefore the most difficult task, perhaps the most responsible of all, and the author thinks that it should be undertaken by the chief officer of the station. Before even the first lorry arrives the station may be besieged by walking wounded, and the staff must never relax their vigilance in periods between raids. Instruments, gloves, and bandages must be ready in sterilized parcels, and the station ready to go instantly into action. He warns the staff against yielding to a temptation to detain particularly interesting cases; they occupy far too much time, during which the lighter cases pile up and congest the waiting-rooms. The relief of pain is an important part of first-aid, and he considers the best drug for this purpose to be the "S.E.E." mixture—scopolamine, eucodal, and ephetonine. A weak solution is injected intravenously until the patient becomes drowsy; with this procedure there is little risk of an overdose. With subcutaneous injection it is unsafe to give more than one ampoule. If the patient is badly shocked, small doses should be given at frequent intervals. Professor Anschütz reminds readers that to be prepared may not be everything, but it is a very large ingredient of success. The work of the station will be done under the public eye, and critics will abound; an adequate performance depends on every member of the staff being ready and doing his best. This counsel applies equally to our own organization. The German medical services are probably being tested already.

[3] *Canad. med. Ass. J.*, 1940, **42**, 109.
[4] *Amer. J. Physiol.*, 1924, **67**, 346.
[5] *Münch. med. Wschr.*, 1939, **86**, 1715.

NEW ZEALAND CENTENARY

First discovered by Abel Tasman in 1642 and visited by Captain Cook in 1769, New Zealand in 1840 acquired colonial status under the Crown, and is now in this hundredth year of its corporate existence a firmly established self-governing Dominion within the British Empire. In the annual report of the Director of Health for 1939, entitled in anticipation the Centennial Number, the health administration of the country is traced from 1840 down to the present day. In 1840 the population of New Zealand was estimated at 110,000 Maoris and 2,000 Europeans. Now there are 86,000 Maoris and 1,500,000 Europeans, to whom some 1,200 qualified practitioners render medical care. The compulsory registration of deaths was established in 1855, and the numbers and rates for the principal causes were made available in 1872. In the latter year, also, there emerged the first Public Health Act, the inspiration of its promoter being that "public health is the corner-stone of all sound legislation." The Public Health Act of 1900 created a State Department of Health under the control of a Minister. The local councils, though at first reactionary, soon developed a proper sense of public responsibility and, as successive enactments empowered the adoption of hygienic reforms, interested themselves in the protection of motherhood, the control of tuberculosis, the combating of venereal disease, the extension of school medical and dental clinics, health camps, free milk, water supplies, hospital provision, and other approved measures. A Board of Health came into being in 1920. It possesses both advisory and mandatory powers, and now coordinates the whole system, which includes, in addition to the health interests referred to above, social security, nursing, nutrition, industrial hygiene, systematic diphtheria and typhoid fever prophylaxis, cancer control, and the repression of hydatid disease. The welfare of the Maori people receives commendable attention. Their death rate is 24.3 per 1,000 and their infant mortality rate 153 per 1,000 live births. As their birth rate is 42.4 per 1,000 the race is at present maintaining a satisfactory natural increase. Their maternal mortality rate, including septic abortion, is 5.4 per 1,000 live births, as contrasted with 4.0 for the white population. A recent epidemic of measles was more severe upon them than upon the Europeans, the respective death rates from it being 2.4 and 0.1 per 1,000. As a result

of the pursuit of an enlightened and generous policy there has been developed in New Zealand a condition of stable symbiosis between the aboriginal and the incoming population which is to mutual advantage. The continued advancement and prosperity of the Dominion will always be followed with cordial interest in the motherland, to which the gallant New Zealand contingents alike in the last and present war sped their effective aid across half the world.

ORDERS FOR THE KITCHEN FRONT

To "put across" to the public sound scientific information in simple idiomatic English is a useful piece of work, and one of special value when the subject matter is so vital as the nation's diet. This has been done in a sixteen-page booklet bearing the title *The Doctors Tell You What to Eat in Wartime*,[1] and issued at a popular price. Some time ago the Central Council for Health Education asked the British Medical Association to tackle the question of wartime feeding. The Association, which had already done much useful work on nutrition, reconstituted a committee of experts to examine dietary problems, especially in relation to rationing. The immediate outcome is this booklet, giving the pith and marrow of the subject served up as appetizingly as the dishes themselves should be. Many weighty treatises on nutrition, even the Royal Institution lectures which are now being published in these pages, could not have been refined down into a happier quintessence. The booklet is attractively printed, and it includes some humorous thumbnail sketches. It is astonishing, when one reflects upon it, that man has been having his more or less regular meals every day for some thousands of years and yet has never properly learned the science and art of eating. The booklet discusses the different foods, grouped according to the needs they satisfy, for warmth and energy, for growth and repair, and for protection, pays special attention to protective foods, a full list of which is given, and adds some useful advice on such matters as the need for safe milk, the value of cheese and pulses, the virtues and limitations of bread, the economics of meat. The advice given is as wholesome as the foods recommended. The role of kindly family doctor is sustained throughout, and even after the ritual of the kitchen is finished and the family are at the table he bids them for their health's sake, as well as for common decency, to refrain from grumbling or quarrelling at meal-times, a meal being a social occasion and an opportunity for appeasement. We hope that the circulation of this booklet will equal the number of homes there are in this country. If its counsels are studied by housewives—and also by their menfolk, who may thereby get some idea of the difficulties attending the selection and preparation of meals—the "war on the kitchen front" will be won.

A MEDICAL STUDENT ASSOCIATION

For two or three years past there has been an annual conference of medical students attended by representative delegates from a large proportion of the medical schools in Great Britain. These conferences have been held under the auspices of the wider organization known as the National Union of Students, and they have been very useful, informative, and encouraging. This year's conference was held at Manchester last month, when nineteen medical schools were represented. One of its results has been the initiation of a more coherent and independent British Medical Student Association. A small document issued by the conference[1] announces that this body "is active at last" and "will work successfully." It is pointed out, however, that the only effective means of its continuance is "student enthusiasm everywhere." Such an association should be welcomed, and it is to be hoped that the enthusiasm will be forthcoming and sustained. A small executive committee has been established, and it is intended that a representative council shall meet twice a year. That organized student opinion on appropriate subjects should be formulated is a valuable thing, and it should be helpful to bring the conditions and methods of the various medical schools into comparison; but it cannot be expected that, with the necessarily limited experience of the realities of medical practice, conclusions will always be valid. The recent conference, for instance, passed a number of appropriate and suggestive resolutions both with regard to improvements in the curriculum and with regard to some matters of importance affecting students in the present emergency. There were, however, two which related to matters of a more general kind on which the conference was not so well qualified to express an opinion. The question of a "one portal" entry to the profession by a single standard national examination is by no means simple, and the present opinion of the profession as a whole is that independence and variety are to be preferred, though the number of separate examining and licensing bodies in these islands is much too large. Again, it is probably true that the number of practitioners in Great Britain might be somewhat increased with advantage to the community in normal times, but the extent to which this is the case is very uncertain. It must be remembered that here the proportion of doctors to population is already much the highest in the British Empire and perhaps in the world; and that the conditions of future practice are also uncertain. But it is all to the good that such a conference should be held, and the opinions of medical students on their education, on A.R.P. organization, and on the contribution they can make to the national effort must be taken into account.

Sir Arthur Harden, D.Sc., F.R.S., late head of the Biochemical Department of the Lister Institute of Preventive Medicine and emeritus professor of biochemistry in the University of London, died on June 17, aged 75. In 1929 the Nobel Prize for chemistry was divided between him and Professor von Euler, and in 1935 he was awarded the Davy Medal of the Royal Society. He jointly edited the *Biochemical Journal* for twenty-four years.

We much regret to announce the death of Dr. R. Fortescue Fox, F.R.C.P., the well-known authority on spas and health resorts, who was president of the International League against Rheumatism and editor of the *Archives of Medical Hydrology*. He presided over the Section of Hydrology and Climatology at the Annual Meeting of the British Medical Association in 1931 and was vice-president of the Section of Physical Medicine in 1932.

[1] *The Doctors Tell You What to Eat in Wartime*. Published by the British Medical Association, Tavistock Square, W.C.1. (3d.)

[1] *British Medical Student Association: The Plan*. Published by the National Union of Students, 3, Endsleigh Street, W.C.1. (1d.)

THE NATION'S LARDER IN WARTIME

*This is an abridged version of one of a series of lectures recently delivered before the Royal Institution**

NATIONAL FOOD REQUIREMENTS

BY

Sir JOHN ORR, M.D., LL.D., F.R.S.

Director of the Rowett Research Institute, Aberdeen

The discovery about twenty-five years ago that a number of commonly occurring diseases, now known as deficiency diseases—of which rickets is an outstanding example in this country—are due to the lack of essential substances in the food (vitamins), and that lack of minerals might also be the cause of ill-health, marked the beginning of a new era in the science of nutrition. Energy-yielding foods such as bread are so abundant and cheap that in normal times there is little likelihood of people suffering from hunger. But the vitamin-rich and mineral-rich foods are still relatively expensive, and the results of dietary surveys show that many diets are deficient in these respects. In recent years, therefore, the tendency has been to emphasize the importance of food for health, and to assume that if the diet contains sufficient protective foods it is unlikely, in view of the cheapness of energy-yielding foods, to be short of calories. In the present discussion national requirements will be regarded from the standpoint of a diet adequate for the health of the population.

Our knowledge of dietary requirements is derived from deductions made from experiments on animals, from direct experiments on human beings, from clinical observations of patients suffering from deficiency disease, and, not least important, from dietary and clinical surveys in which health and physique of families or communities are compared with the kind of diet eaten.

From these data dietary standards have been drawn up. In 1933 the British Medical Association published a report giving examples of diets for families of different size and composition "at minimum cost." In the same year the Department of Home Economics of the United States Government issued what has become known as the Stiebeling standard, stating requirements in terms of constituents, and also in terms of foodstuffs which supply the different constituents in the necessary amounts. In 1935 an International Committee was appointed by the League of Nations to draw up dietary standards based on physiological needs. It confined itself to the needs of pregnant and nursing women, children, and adolescents.

[The lecturer here showed a table, "Average Requirements per Head of Population," in which these three standards were compared, adding that agreement between the standards was fairly close. They would doubtless be modified in the light of further knowledge, but meantime might be taken as yardsticks to give a rough measure of the adequacy of diets.]

Dietary Standards

Standards expressed in these technical terms, while essential for those engaged on research, convey little to the ordinary public. People think in terms of foodstuffs, and not in calories or other units. The following tables taken from the League of Nations report give an illustration of the kind of diet which would supply sufficient amounts of all essential food constituents for the classes of persons specified:

Pregnant or Nursing Woman	Per Week
Protective Foods:	
Milk	12.3 pt.
Meat, etc.	29.6 oz.
Eggs	7
Cheese	7.4 oz.
Green vegetables	24.7 oz.
Potatoes	61.7 oz.
Legumes	2.5 oz.
Cod-liver oil	24.5 g.
Fruit	Not stated
Energy-yielding Foods:	
Cereals	61.7 oz.
Fats and sugar	As needed

Child, 5-7 Years	Per Week
Protective Foods:	
Milk	12.3 pt.
Eggs	7
Meat, fish, liver, or cheese	7.4 oz.
Green vegetables	24.7 oz.
Potatoes	37.0 oz.
Cod-liver oil	21 g.
Fruit	Not stated
Energy-yielding Foods:	
Fats (butter)	4.9 oz.
Cereals (bread)	24.7 oz.

The Canadian Medical Association has just issued a booklet entitled *Food for Health* which gives examples of diets for individuals and families of varying size and composition.

[The lecturer showed the Canadian Medical Association tables for a child and for a family.]

These diets are merely examples of the kind of diet which will provide a sufficient amount of all nutrients needed for health. An almost unlimited number of equally good diets could be drawn up with the protective foods in different proportions or with other foods not mentioned, but any diet fully adequate for health must contain the same high proportion of protective foods. The Advisory Committee on Nutrition, set up by the Government in 1931, has not issued any report giving examples of diets. It has, however, endorsed the League of Nations report and, as a first step towards bringing the national diet up to the standard for health, has strongly recommended that measures be taken to ensure that every child shall have at least one and a half pints of milk per day.

Diets in Common Use

[The lecturer showed the graphs overleaf, indicating the estimated average intake of two typical protective foods—namely, milk and vegetables—at different income levels.]

The consumption of protective foods falls as family income falls, because they are more expensive than the energy-yielding foods. This is shown in the following table:

Cost of 2,500 Calories (Prices: Aberdeen, January, 1940)

	s. d.		s. d.
White bread	4½	Cheese	1s. 6d. to 2s. 8d.*
Margarine (cheap)	4¼	Milk	1 8
Sugar	6	Vegetables	2 7
Potatoes	6½	Eggs	5 1½
Meat	10d. to 3s.*	Fruit	5 5¼

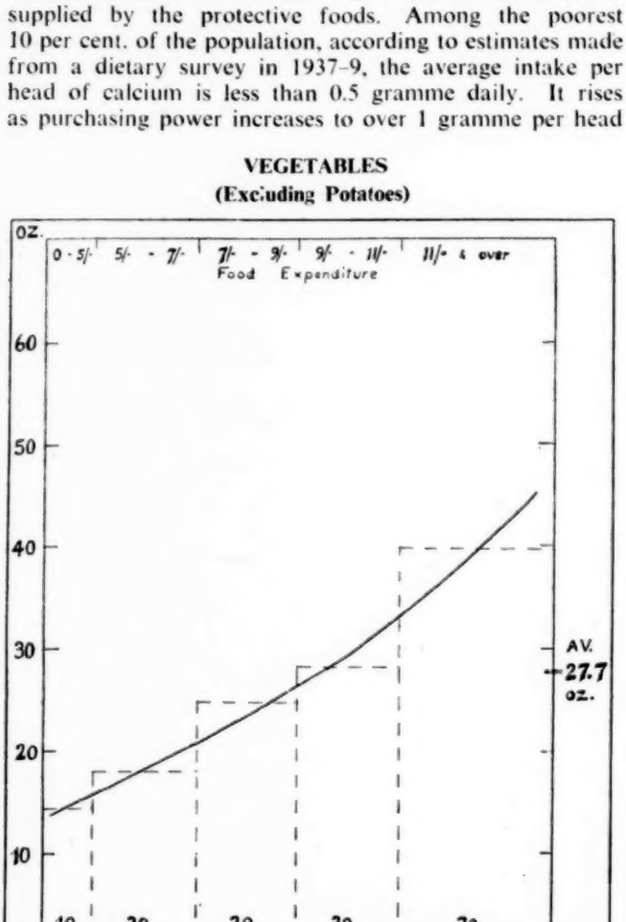
* According to quality.

Among the poorer half of the population protective foods are rationed by price. Consumption is determined by the ratio of retail price to purchasing power. A small rise or fall in the retail price of butter is accompanied by a corresponding decrease or increase in consumption. Even in the case of a relatively cheap food like potatoes consumption is affected by price. The difference in the amount of protective foods consumed by different classes is reflected in the composition and health value of their diets. Calories are cheap and, consequently, the calorie intake of all, except the very poor, is adequate. There is practically no starvation, or even hunger, in this country.

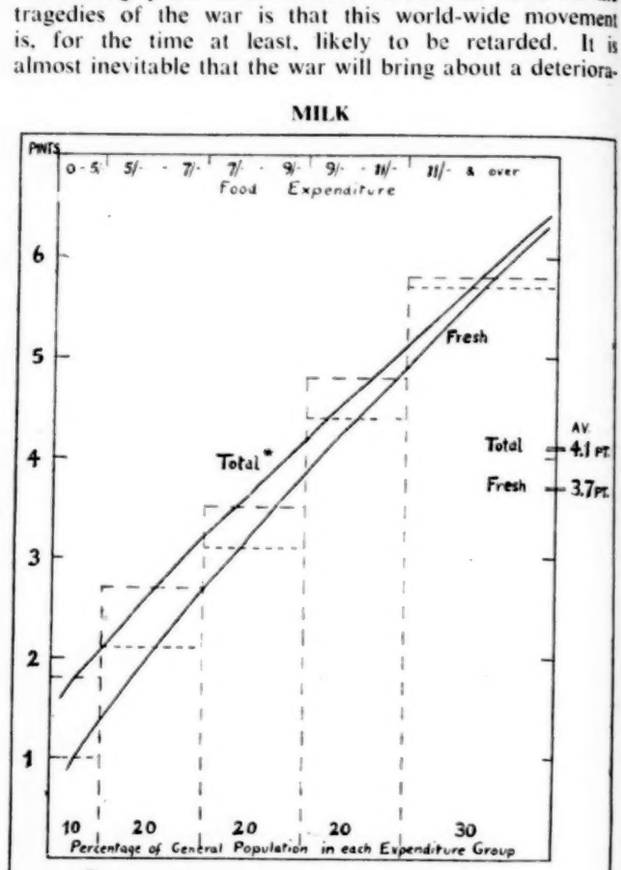
* The lectures will be published *in extenso* by Messrs. G. Bell and Sons, Ltd., of York House, Portugal Street, W.C.2.

The average protein intake of all classes is also up to requirements, save probably among pregnant and nursing women and young children of the poorest class.

The biggest difference between the diets of the poor and the well-to-do is in the intake of vitamins and minerals supplied by the protective foods. Among the poorest 10 per cent. of the population, according to estimates made from a dietary survey in 1937–9, the average intake per head of calcium is less than 0.5 gramme daily. It rises as purchasing power increases to over 1 gramme per head among the wealthiest third of the nation. The main source of calcium is milk, and intake corresponds roughly with milk consumption. Vitamin A increases from about 2,000 international units among the poorest to about 4,800 among the well-to-do, vitamin B_1 from about 300 to about 630, and vitamin C from about 680 to about 1,700 per head daily.



GRAPH 1.—Average intake of vegetables at different income levels.



GRAPH 2.—Average intake of milk at different income levels.

Consumption of Protective Foods

In the last twenty-five years the average consumption of protective foods has increased by roughly about 50 per cent., resulting in an improvement in health and physique shown by the elimination of the grosser forms of deficiency disease, an increase in stature of adolescents, a fall in infant mortality rate of about 50 per cent., and a decrease of the death rate from tuberculosis. This improvement has gone on at an even faster rate during the last five or six years. Dietary surveys made between 1932 and 1936 indicated that the diet of nearly one-half of the population was not up to the Stiebeling standard, but another survey, made in 1937 and 1939, the results of which are not yet published, indicates that the proportion not up to standard has been reduced to one-third, and, what is equally important, that the deficiencies in the diet of the poorest are not as great as they were. The intake of calcium has increased among the poorest section of the population by about 30 per cent. The great improvement in the national dietary had resulted in the almost complete disappearance of the grosser forms of deficiency diseases, such as rickets, scurvy, and xerophthalmia.

Before the outbreak of the war a similar improvement was taking place in most other countries. One of the tragedies of the war is that this world-wide movement is, for the time at least, likely to be retarded. It is almost inevitable that the war will bring about a deterioration of the diet. Indeed, there is grave danger of shortage of food and actual starvation in widespread areas.

National Diet and the Present Emergency

Some may consider that in the present national emergency the health value of the national diet is of only secondary importance. On the contrary, the war has increased the necessity for ensuring that so far as possible the diet of the whole nation should be adequate for health. The issue may be decided on the home front, victory going to the nation which can show the greatest stamina and powers of endurance. Courage and powers of endurance depend to a large extent upon health and physical fitness, and all that we have learned in the last twenty-five years shows the overwhelming importance of food in relation to health. One aspect of this subject which is only beginning to be studied but which is of the utmost importance in war is the psychological effect of diet. It is doubtful whether any physical signs of malnutrition are unaccompanied by psychological signs. People suffering from malnutrition tend to be apathetic and despondent and, at times, hyperexcitable. Nervous debility and lethargy are characteristic of deficiency of vitamin B_1; early onset of fatigue and despondency are characteristic of nutritional anaemia.

We must not be content merely with trying to maintain the national dietary as near as possible to what it was in peacetime. It is as important to apply all our scientific knowledge to the improvement of the diet of the nation as to apply scientific knowledge to the improvement of weapons of war. The objective of war food policy should be, first, to supply sufficient of the protective foods for health, and then sufficient of the energy-yielding foods.

To meet national requirements on this basis we need to increase the supply of protective foods and also the total amount of food. The food requirements of the men who go into the fighting Services are increased by from 25 to 30 per cent. The same is true of the unemployed taken into the heavy industries. The total food requirements of the nation must therefore be increased by between 5 and 10 per cent.

Wartime Food Policy

This increase in supplies has to be met at a time when it is necessary to economize in shipping space and in foreign credits. In peacetime we produced at home what could not be imported cheaply, our imports amounting to about two-thirds of our total supply and requiring about 20 million tons of shipping per annum. In wartime our food policy must be based on home production. Our imports, apart from what we purchase for economic reasons or to keep the food out of the hands of the enemy, must be limited to what cannot conveniently be produced at home. Under these conditions we must be prepared for some change in the national dietary. We shall be fortunate if in the war and post-war period we can provide sufficient food to maintain the whole population in health, even though some of our likes and dislikes have to go by the board.

Fortunately it is possible to obtain all the nutrients which the body needs from a few foodstuffs. We should choose for increased home production those which are of the greatest value for health and, at the same time, yield the maximum amount of food per acre. In this category would come vegetables and potatoes. Of animal products the most important for health is milk. With a shortage of feeding-stuffs the dairy cow should have priority. If we had sufficient vegetables, potatoes, milk, and oatmeal we could meet national requirements for the protective foods. These, taken together in large amounts, would supply all the protein, vitamins, and minerals which the body needs.

Sufficient milk is being produced to provide 0.6 pint per head per day if it were all used in liquid form. The production of vegetables is being increased by allotment schemes, and could be increased sufficiently to bring consumption up to 6 oz. per head per day, the level among the wealthiest part of the population. Owing to the ease with which potatoes can be produced consumption might profitably be increased to 16 oz. per head per day. There is sufficient oats at peacetime level to provide 2 oz. per head per day, and still leave a considerable surplus for use as an animal feeding-stuff. The consumption of sugar might be reduced from its present level of 2.7 oz. per head per day to, say, 1 oz.

The following table shows the kind of diet which could be made up from the amounts of home-produced foodstuffs stated above and the peacetime average consumption of wheat and fats (butter, margarine, and cooking fats), the consumption of sugar being reduced to 2 oz. per head. In addition to the foodstuffs named there would always be home-produced beef, mutton, some eggs and bacon, and some imports of other foods, especially cheese and dried fruits.

	Calories	Proteins	Calcium	Iron	Vitamins (International Units)		
		gm.	gm.	mg.	A	B_1	C
Protective : Milk .. 0.6 pt. Vegetables 6 oz. Potatoes 16 oz. Oatmeal 2 oz.	800	27	0.56	6	2,890	479	1,713
Energy-yielding : Bread .. 11.8 oz. Fats .. 1.8 oz. Sugar .. 1 oz.	1,300	23	0.11	7	615	167	—
Total nutrients ..	2,100	50	0.67	13	3,500	646	1,713
Pre-war diet of poorest 10 per cent. ..	2,000	56	0.48	10	2,000	310	680

The above hypothetical diet is given not as a model which might be used as a basis for rationing but merely as an illustration of the fact that it is possible to make up a fairly satisfactory diet from a small number of foods, the most important of which can be produced at home in sufficient amounts. The difficulty is to ensure the equitable distribution of the food. We cannot get this by rationing unless the rationed amount is within the purchasing power of every family. The Government has allocated 50 million pounds a year to keep down food prices. But it is important to subsidize the right foods. A short list of home-produced and easily imported foods, such as that given above, from which a diet nearly adequate for health could be made up, would form a suitable iron ration which Mr. Keynes, for economic reasons, has suggested. If we had sufficient of these to meet the needs of the whole population, and at a price within the purchasing power of every family, the food position would be secure.

TREATMENT OF HEAD INJURIES IN WAR

BY

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The time is opportune to review the experiences of the belligerent nations in the treatment of head injuries of modern warfare. From both sides there come reports of operations which indicate that the principles of treatment are not sufficiently understood by all the civilian and Service doctors who are now called upon to care for head wounds of a type not encountered in civil life.

Wounds of the Brain

In the first stage of the war the open head wounds have been like those of the war of 1914–18, but both French and German authors[1 2 3 4] have found that operation may be delayed longer than was previously thought safe, even up to forty-eight hours after the injury. In their view there is no call to operate before shock has been adequately treated, and, if the conditions of war are favourable, wounded may be transferred before operation to the C.C.S. or even the Base, as in the Polish campaign, where the Germans evacuated their wounded by air.[5]

All writers stress the importance of avoiding hasty and incomplete operations. Brain tissue resists and localizes bacterial infection as well as, if not better than, other tissues; it is the ventricular cavities and large basal cisterns that are so vulnerable to the spread of infection. In brain wounds, as in wounds of the limbs, it is desirable to remove necrotic tissue, bone splinters, and foreign bodies, with the object of preventing or restricting the spread of infection in the form of purulent encephalitis, abscess, purulent ventriculitis, and meningitis. The aim is to

obtain a clean, smooth-walled cavity which, with the aid of light packing, will heal by granulation. This is the ideal, but there are weighty limiting factors. The operation must be done without encroaching on important nervous pathways that are known to be intact, and without opening the ventricular cavities or basal cisterns. Preparations for treatment therefore include thorough clinical examination and radiographic survey of the foreign bodies. Missiles deep in the brain should usually be left alone, and superficial wounds over such important areas as the pre- and post-central gyri should be interfered with as little as possible. How is the balance to be struck between conservative methods so essential in some cases and the bold operation so necessary in other cases if fatal infection is to be prevented? Inadequacy of surgical facilities will in some instances decide this question for the time being, but in most doubtful cases the only sure guide to treatment is the clinical state of the patient, observed from day to day. In a patient with a deep penetrating wound of the brain with small aperture, intervention may at times be postponed until the physical signs or increase of protein in the cerebrospinal fluid indicate that the brain lesion is extending instead of healing.

In large open wounds of the brain the removal of necrotic tissue is easy if suction apparatus is available. This apparatus is essential in all brain operations. After careful haemostasis the wound is lightly packed and the condition of the resulting brain fungus is subsequently controlled by lumbar punctures at frequent intervals.

In penetrating and tangential wounds of small aperture opinions differ as to the best method of approach to the damaged area of the brain. The orthodox method, which is favoured by Tönnis,[3] is to nibble away the bony edges of the wound until the opening is large enough to enable the surgeon to deal with the brain wound under direct vision. French surgeons,[1] on the other hand, advocate access by means of an osteoplastic flap on the grounds that with the better exposure they can clear the damaged area more thoroughly and thus reduce the subsequent incidence of abscess formation. The resulting skull defect is much smaller, and the risk of meningitis in wounds of the convexity of the brain is, they claim, not increased. This policy is the logical outcome of Clovis Vincent's work[5] on the treatment of the brain abscess of civil life by means of osteoplastic flaps. The idea that any brain wound should be treated by an osteoplastic flap is a new one, but it will not be lightly rejected by those who have seen the great improvement in the results of brain abscess approached by osteoplastic flap.

All these elaborations of treatment prompt the question—How can we hope, in a war of movement in which segregation is rarely possible, to have our wounded treated in a way that requires special equipment and to some extent special experience? The War Office has made a promising approach to this large problem in establishing mobile neurosurgical units[6]; and the provision of the necessary equipment and training of the young surgeon to do this, along with other varieties of war surgery, are by no means beyond its powers.

THE CRUCIAL DECISION

Improvements will also follow with clearer recognition of the limitations of the surgical method in all forms of head injury, and of the dangers of some types of incomplete operation in brain wounds. It is obvious that all scalp wounds should be surgically cleaned as soon as possible, and in most cases the fractured skull should be dealt with. With the steel helmet, of which in modern warfare some types are probably more effective than others, there are fortunately many head wounds in which the dura is intact and the underlying brain damage slight and temporary. In each operation the crucial decision comes when the outer surface of the dura is reached. The dura is a natural barrier not only against injury and infection from without, but also in protecting the brain from fungation and from invasion by connective tissue. It is disastrous in open head wounds to extend a dural wound with the idea of obtaining a useful decompressive effect. The sequel is a damaging or fatal brain fungus. The rule to be aimed at should therefore be that the opening in the dura should not be enlarged unless the surgeon is adequately equipped and prepared to go on and remove the necrotic brain tissue and clot to an extent that will leave the brain at the conclusion of the operation free from undue tension and from potentially infected material.

Primary suture of the scalp over brain wounds is looked on with disfavour by most authors. The formation of brain fungus is not unfavourable provided the necrotic tissue has been thoroughly cleaned out and the dural defect is not large. However, if the wound is recent and the condition of the scalp permits it, primary suture may be done in certain cases. It does not prevent invasion of the exposed brain by connective tissue. Primary repair of the dural defect cannot yet be regarded as a safe procedure in gunshot wounds.

Antiseptics

While there is as yet no conclusive proof of the prophylactic value of the sulphonamides the preliminary impression of their use by mouth and subcutaneously is in all quarters favourable, and they are probably responsible, in part at least, for extension of the waiting period before operation. Tönnis has also used prontosil packs in large open wounds of the brain with good results. Falconer and Dorothy Russell[7] and Manifold[8] have conducted experiments on rabbits to determine the damaging effect of antiseptics on the brain substance, as judged by histological and metabolic criteria. They have found that the least harmful of a large series of the recognized surgical antiseptics are proflavine sulphate (1/1,000) and another member of the flavine series, 2:7-diaminoacridine (1/1,000). Soluseptasine in 3 per cent. solution is relatively harmless. They showed that with all antiseptics least damage was done when the antiseptic was applied in isotonic and approximately neutral solution.

Closed Head Injuries

In all countries, it seems, some surgeons are still performing decompressive operations in cases of closed head injury. This method of treatment, as Ferey[2] points out, is usually unnecessary and may even be harmful. It was shown some years ago, by Ritchie Russell,[9] that the unconscious state after closed head injury is not directly related to rise of intracranial pressure. As a result the operation of subtemporal decompression, which had never yielded convincingly good results in closed head injury, began to fall into disuse, and there has been a growing body of opinion that operation in the acute state is rarely called for except in cases of subdural and extradural haematoma.

REFERENCES

[1] Gargin, R., and Guillaume, J. (1940). *Mém. Acad. Chir.*, **66**, 124.
[2] Ferey, D. (1940). Ibid., **66**, 242.
[3] Tönnis, W. (1940). *Dtsch. med. Wschr.*, **65**, 57.
[4] Ducuing, J., d'Harcourt, J., Griño, A., and Folch, A. (1939). *Rev. Chir., Paris*, **58**, 625.
[5] Vincent, C. (1936). *Gaz. méd. Fr.*, **43**, 93.
[6] *British Medical Journal* (1940), **1**, 661.
[7] Falconer, M., and Russell, D. S. (1940). *British Medical Journal*, **1**, 631, and *Proc. roy. Soc. Med.* (in the press).
[8] Manifold, M. C. (1940). *British Medical Journal*, **1**, 631.
[9] Russell, W. R. (1932). *Brain*, **55**, 549.

PHYSIOTHERAPY IN EMERGENCY HOSPITALS

On behalf of the Minister of Health (Mr. Malcolm MacDonald) Sir George Chrystal, secretary of the Ministry, received at the Ministry on June 13 a deputation from the Health and Housing Committee of Members of the House of Commons on the subject of physiotherapy. The deputation consisted of Sir Francis Fremantle, M.P., Captain Elliston, M.P., Sir Ian Fraser, M.P., Dr. A. B. Howitt, M.P., Sir Robert Bird, M.P. Lord Dawson of Penn was also present.

The deputation emphasized the need for adequate and early facilities for physiotherapeutic treatment being provided at hospitals in the emergency hospital scheme administered by the Ministry of Health. Sir George Chrystal, in reply, said that in the case of orthopaedic and war-strain injuries the Ministry regarded it as essential that the scheme should provide for physiotherapeutic treatment not only in the early stages but in the recovery or convalescent stages also. In other types of case, however, civilians would receive any necessary further treatment of this kind either as out-patients at hospitals or from general practitioners. The Ministry was now in consultation with the War Office with regard to the planning of convalescent treatment for Service cases. At all general hospitals in the Emergency Medical Service massage and electrical treatment at the bedside were available. Each of the hospital authorities concerned had been authorized to engage masseurs as required, and additional apparatus where needed, had been and was still being provided on request. Many general hospitals had, before the war, a special department for massage and electrical treatment. Additional accommodation and apparatus had been provided in some of these, and new departments were planned for such hospitals as were being substantially enlarged.

In orthopaedic and war-strain cases, Sir George Chrystal said, the Emergency Medical Service provided treatment also for the rehabilitation stages of recovery. There were nineteen special orthopaedic centres at which massage, radiant heat, electrical treatment, and remedial gymnastic exercises were, or would shortly be, available. At these centres also there would be departments for occupational treatment. The E.M.S. also provided five centres for war strain in addition to the Effort Syndrome Centre at Mill Hill. Here remedial exercises and remedial occupation were being provided, in addition to massage and electricity. These twenty-four centres were situated in various parts of the country, and the intention was to transfer to them from the general hospitals all cases in which the special facilities which the centres provided were likely to be beneficial. The Ministry was now reviewing the hospitals in its Scheme with a view to ensuring that the necessary apparatus was available wherever necessary. The assurance had been given that the full expenses of engaging extra staff for physiotherapeutic purposes would be reimbursed by the Government.

CANADIAN RED CROSS HOSPITAL

A fully equipped Red Cross hospital is being presented by the Canadian Red Cross Society to the Army Medical Corps of the Dominion to serve sick and wounded Canadians in England. The hospital occupies about twenty-two acres on Viscount Astor's estate, Cliveden, near Taplow. It is the ground which was occupied by a Canadian hut hospital during the last war, and it has been leased to the Canadian Red Cross by Lord Astor (in a most impressive document) for one shilling a year. The cost of erecting and equipping the hospital—the equipment is still far from complete—will be about one million dollars.

The wards, parallel to each other, and reached by a long corridor extending the entire length of the building, number fifteen, and each will accommodate thirty-six, or in an emergency fifty, beds. There is a special wing for officers, also a complete operating block, an *x*-ray department (not yet quite ready), a dispensing department, and dining and staff rooms and kitchens. The main building of the hospital forms three sides of a courtyard, and above the dignified porch with its white colonial pillars is the vividly coloured and gilt crest of Canada. A large red cross is set in the flooring in the centre of the foyer, and the furniture of Canadian maple in early colonial design will remind the patients of their home country. The colour scheme of this part of the hospital is pale grey, but the wards have pale green walls and beds and darker green dado, which is considered soothing and therapeutic. Each ward opens on to a sun porch furnished with verandah furniture. Of the four operating rooms two are equipped with hydraulic tables brought over from Canada. The modern sterilizing equipment is batteried to provide maximum efficiency. There is a dental clinic with its own *x*-ray equipment, an eye, nose, and throat clinic, and a series of consulting rooms. In addition to the ordinary hospital laboratory a special laboratory is being furnished at the expense of the Canadian Red Cross to the requirements of Sir Frederick Banting, but the purpose of this laboratory is at present a secret. Other features of the hospital are the enclosing—not the mere roofing over—of all connecting corridors, and the institution of central heating by an overhead system. The nurses are housed at Taplow Lodge near by, and five cottages on Lord Astor's estate have been renovated and furnished for the sixteen doctors, who have their dining room and lounge in the main hospital building.

The officers connected with this enterprise include Colonel George Nasmith, former public health officer in Canada, who was attached to the mobile field laboratory for the B.E.F. in 1915, and is now Deputy Commissioner of the Canadian Red Cross Society in London; Major C. A. Scott, Assistant Commissioner, who has had the supervision of the purchase of the Taplow equipment; Colonel R. M. Luton, senior medical officer with the Canadian Forces; Major J. C. McKenzie, general superintendent of the Montreal General Hospital; and Colonel C. L. T. Arthur, a well-known Winnipeg medical man, who is in charge of the staffing of the hospital. The matron-in-chief of the Canadian Military Nursing Services is Miss E. F. Pense, who served with the Canadian nurses during the last war.

EVACUATION OF MOTHERS AND YOUNG CHILDREN

A meeting of the National Baby Welfare Council was held at the British Medical Association House on June 14 to discuss the position of expectant mothers and of children under 5 years of age in the event of serious air raids. The chair was taken by Dr. D. H. GEFFEN, who said that the question of compulsion had been settled for the time being by the Minister of Health's statement the previous day against that policy. There appeared to be no neutral countries in Europe which could take British children, but the Dominions might be considered, and many believed that evacuation should include removal to other parts of the Empire. The reason why parents had been as yet so loath to let their children go was due to a feeling that all parts of the country were more or less equally vulnerable, and they did not want to be parted from their children unless they were assured of their absolute safety.

Dr. E. ASHWORTH UNDERWOOD (M.O.H., West Ham) said that the problem had two aspects—that of inducing people to be evacuated in large numbers, and that of inducing them to remain away once they went. Last September 166,200 mothers with 260,000 young children were evacuated, but within six weeks three-fourths of them had returned home. There were four reasons for their return: (1) the expense of two homes; (2) difficulty of adaptation to the family with whom billeted; (3) claims of the husband; (4) dislike of the country by many townswomen. The homing instinct had to be reckoned with, and legislation could not cut across it. He wondered whether it would be possible to evacuate to reception areas women who had young children and who would

be willing to work in the local industries. Their children could be cared for in hostels and nurseries by day, and restored to them in the evening, when some kind of communal life among the evacuees might be established. In the present re-evacuation only 6,000 out of 22,000 children in his area had gone.

Dr. NORA WATTIE (senior child welfare medical officer for Glasgow) said the civil defence measures cut across the public health services in many evacuation areas. The basic work in the child welfare service was home visitation and guidance. The Government should be urged to prevent any great diversion to casualty services of women skilled in home visitation and child nursing. Dame LOUISE MCILROY urged the need for evacuating the expectant mother, not merely women in the eighth month of pregnancy, but in earlier months when the danger of miscarriage was greater. Dr. DUNSTAN BREWER (late M.O.H. for Swindon) spoke in favour of compulsion; it was "only a question whether compulsion came from the Government or from the German invasion." If evacuation was to be compulsory, obviously reception must be compulsory also. Of the other speakers one urged that evacuation should be compulsory for children under 5 and for all expectant mothers of over three months' pregnancy.

A resolution supporting the general principle of evacuation of mothers and children to the Dominions, and urging the Government to proceed with such evacuation with the utmost speed and on the largest scale possible, was carried. A further resolution that some form of evacuation be compulsory for all children in vulnerable areas was carried by 44 to 8, and a resolution asking the Government to expedite the (non-compulsory) evacuation of expectant mothers was carried with a few dissentients.

Reports of Societies

CLINICAL EXPERIENCES WITH SULPHATHIAZOLE

At a meeting of the Section of Therapeutics and Pharmacology of the Royal Society of Medicine on June 11, with Dr. J. W. TREVAN in the chair, a discussion was held on clinical experiences with sulphathiazole, or M & B 760 (2-(*p*-aminobenzenesulphonamido)thiazole), more particularly in the therapy of staphylococcal infections.

Dr. A. J. EWINS, chemical director of May and Baker, Ltd., opened with some introductory remarks on the research on sulphonamides in general. Sulphathiazole, he said, had recently been the subject of a number of publications in the United States, in which, on both experimental and clinical grounds, it was claimed to be a particularly effective agent against streptococcal infections and to be as effective as sulphapyridine against pneumococcal infections, and at the same time to be better tolerated and of lower toxicity than the latter drug. The development of this drug began in this country in 1938, when, after the pyridine compound was found likely to be of interest, attention was turned to certain other compounds, and one of his colleagues prepared a corresponding compound of thiazole. Time alone would show which was the better drug. Sulphathiazole seemed undoubtedly to be less toxic than sulphapyridine, but whether it was effective in pneumonia remained to be seen. With regard to its action against staphylococci, at the time this work was in progress those concerned were not particularly interested in staphylococcal infections, and there was no successful *in vivo* method of assessing the value of the drug. But recently the Americans had suggested that it was far superior to sulphapyridine as an anti-staphylococcal agent. Dr. Ewins reviewed the development of the more important sulphonamide derivatives which had found clinical application, from the fundamental discovery by Domagk of the bactericidal properties of "sulphonamide chrysoidine," the original prontosil (afterwards prontosil rubrum).

Use in Severe Staphylococcal Infections

Dr. C. E. B. BUTLER said that the treatment of severe staphylococcal infections might be divided under three heads: (1) combating toxaemia by means of antitoxin with a high anti-leucocidin content; (2) chemotherapy when once the patient's resistance had been raised by natural or artificial aids; and (3) the treatment of the bacteriaemia by adequate drainage or removal of the primary septic focus from which the bacteriaemia was coming. Up to the present he had used sulphathiazole in only five cases of severe staphylococcal infection. The first was a low-grade staphylococcal septicaemia from an infected finger. After one course of sulphathiazole the blood culture was still positive. Removal of the finger and another course of the drug were followed by a negative blood culture. The patient unfortunately died ten days later from cardiac failure. The second case was one of severe cellulitis of face and orbit; the organisms were *Staph. albus* and *Strep. viridans*. There was no definite improvement, and the patient finally died from a pyopneumothorax. The third case was a severe suppurative infection of the skin due to *Staph. aureus*. No response was made to the drug—a full course of sulphathiazole was given during one week after admission—and the patient died of bronchopneumonia. The fourth case was one of *Staph. aureus* cellulitis of the thigh, with a negative blood culture. Antitoxin was given, together with a full course of sulphathiazole. Rapid and complete recovery ensued. The last case was a severe cellulitis of the face with signs of cavernous thrombosis. The patient was given antitoxin and sulphathiazole. There was no improvement after administration, and the blood culture rose to 150 colonies, with signs of meningitis. Other treatment was adopted, and at the time of writing the patient was still alive, but hemiplegia persisted and ultimate recovery was doubtful.

Sulphathiazole was of little proved value in patients with a strong blood-stream infection. It might be of value in those cases in which the source of the bacteriaemia was abolished by aiding the patient to get rid of the remaining infection. Cases of cellulitis without bacteriaemia might benefit from the drug. Finally, if it was to be used early diagnosis was essential, other means of treatment by surgery and antitoxin must not be neglected, and maximum doses should be employed. The results so far did not support the optimistic reports from America.

Dr. H. M. MCCREA reported two cases of septicaemia due to infection by *Staph. aureus*, one non-haemolytic and the other haemolytic, both having their origin in a carbuncle in the neck. The first case displayed acute symptoms for eight weeks before treatment with sulphathiazole was started. When the first dose was given the patient was in a high state of infection, both elbow-joints containing a purulent fluid from which the same type of organism as that found in the carbuncle was cultured. After administration of sulphathiazole the patient recovered completely with no disability except the end-results of an obturator neuritis. In this case blood cultures proved sterile, but there could be no doubt that it was a true septicaemia from the clinical story and from the fact that the same organism was found in the urine and in the different lesions as was found in the carbuncle. In the second case the blood on three occasions yielded the same type of organism—*Staph. aureus haemolyticus*—as that which had been cultured from the carbuncle. The patient was first given sulphathiazole on the tenth day after the carbuncle had appeared. The only secondary lesion was an infarction in the base of the left lung. The sputum contained large numbers of the same type of organism as was found in the carbuncle. After the patient had left his care she twisted a knee-joint. A large serous effusion occurred, and it was necessary to aspirate the joint, but the fluid was clear and gave no growth on culture.

One difficulty in these cases was nausea, and he had no doubt that the nausea was brought on by the tablets. Another difficulty was that after administration of the drug the secretion of urine diminished. Administration was stopped when the danger signal of granular casts and blood corpuscles appeared. In neither case was there enough pus in the urine to suggest a localized infection of the kidney or its surroundings.

Osteomyelitis treated with Sulphathiazole

Dr. G. MELTON described six cases of osteomyelitis and five cases of carbuncle of the face treated with sulphathiazole. In the first—an acute osteomyelitis of radius and ulna after open reduction of fracture—the condition improved but did not clear up after sulphapyridine. Sulphathiazole was given, the total dosage employed being 26 grammes. The patient complained of headache and vomited after each injection. The urinary output and the urine were both normal. There was marked improvement after sulphathiazole. In the second case—an acute osteomyelitis of the lower end of the humerus—pyrexia persisted after sulphathiazole but subsided after drainage of subperiosteal abscess. In the third case—an acute osteomyelitis of the upper end of femur—the condition cleared up after sulphathiazole. The fourth case was one of Brodie's abscess of the lower end of the femur. Pyrexia occurred after drainage, but subsided after administration of sulphathiazole. The fifth case was one of acute osteomyelitis of the ilium and suppurative arthritis of the hip. Blood culture yielded *Staph. aureus*. No definite improvement followed sulphathiazole, the blood culture remaining positive. The sixth case was still under treatment.

Of the five cases of carbuncle, four recovered after sulphathiazole and the fifth was still under treatment. His experience with sulphathiazole was that large doses were necessary to achieve results comparable with sulphapyridine. He was not prepared to offer any comparison as between the two drugs. As for toxic symptoms, he found vomiting to be unusual. A tendency to leucopenia was observed in four cases after large doses. A rash resembling erythema nodosum was seen in two cases.

Sulphathiazole in Meningococcal Infections

Dr. H. S. BANKS said that he had treated fifteen cases of meningococcal infection with sulphathiazole. Of this number, thirteen were in adults and two were in children, and four of the adults were over 40 years of age. He could not say that the cases were at all severe; four of them might have been classified as mild. He started usually with one to five doses of sulphapyridine, and then changed the drug to sulphathiazole, but in three of the cases sulphathiazole was given from the outset. He had been impressed with the rapidity of the clinical improvement from this drug, and also with the rapid way in which the cerebrospinal fluid cleared up both bacteriologically (it was all clear within twenty-four hours except in one case) and so far as the cellular count was concerned. The advantage of the drug appeared to be that there was practically no nausea, no vomiting, and no depression. There might be occasional vomiting, but nothing like that experienced with sulphapyridine. Practically no cyanosis was to be observed.

Mr. KENNETH M. PARRY said that he had treated three cases with sulphathiazole. One was a case of osteomyelitis of the spine with an abscess. A course of 25 grammes of sulphathiazole was given, and the condition remained very much the same. The patient was also treated by aspiration of the abscess and was put in a plaster bed. The second case was an osteomyelitis of the head of the radius. A course of 25 grammes of sulphathiazole was given; the condition was still present, and pus was coming from the arm, though it was now sterile—the contrary obtaining before the course. The third case was that of a boy with a history of a boil on his right elbow. He came in with a temperature of 104° F. and some neck rigidity, and it was thought he might have meningitis. Lumbar puncture revealed no abnormality. He was given a course of 25 grammes of sulphapyridine, during which his temperature fell to 102° F., but at the end it began to climb again, and the blood culture showed thirty colonies of *Staph. aureus* per c.cm. A course of 60 grammes of sulphathiazole was given—two doses of 4 grammes at the beginning, and then 3 grammes four-hourly, but at the end of that time his temperature was still 104° F. A blood culture had been done, but he had not heard the result. Dr. F. E. CAMPS also described a case of ulcerative myelitis in a child in which both sulphapyridine and sulphathiazole were given, but the child had died.

Dr. E. N. ALLOTT mentioned that a very large number of the urine specimens of patients who had been receiving this drug contained crystalline derivatives of the drug in large quantities. One or two patients had shown in every specimen enormous amounts of such derivatives—he supposed they were acetyl derivatives of the drug. In a febrile patient who was possibly not excreting a large volume of urine the risk of interference with the efficient working of the kidney by this crystalline compound was possibly serious. The tendency of the drug to form more insoluble compounds than sulphapyridine had to be remembered. With febrile patients on this drug, fluids should be pushed all the time.

Dr. J. W. TREVAN said that it appeared that with sulphathiazole no such dramatic control over the staphylococcus as sulphapyridine and sulphanilamide gave over the streptococcus was possible. He wondered how much of the difference in cases and results which had been shown in the present discussion might be due to the difference in strains. He thought also that there might be something in the point that staphylococcal infections tended to produce abscesses forming loci into which the drug could not penetrate.

Correspondence

Sulphapyridine for Gas Gangrene

SIR,—Mr. McNeill Love's letter (June 1, p. 908) has confirmed some observations made at the Wrexham Emergency Hospital on a case of gas gangrene of the forearm.

The patient, a soldier aged 20, was admitted with a shrapnel wound of the forearm. The entrance was small, but a piece of shrapnel the size of a large almond was present about three and a half inches down the track. Signs of deep sepsis with oedema of the forearm and hand prompted me to remove the foreign body and counterdrain the blind end of the wound through a separate incision after examination of the wet *x*-ray film. Six hours later the dried film showed distinct signs of gas formation, and examination of the patient showed increase in the oedema, the temperature had risen from 99.5° to 100.5° F., and the pulse from 100 to 110; the general condition was good. No crepitus could be elicited. Carrel-Dakin irrigations were started immediately, 16,000 units of anti-gas-gangrene serum was injected, and sulphapyridine 2 grammes given by the mouth and repeated in four hours, after which the dose was halved.

On the following day the temperature had risen to 102° F., with no increase in pulse rate, no crepitus, and no deterioration in general condition. The wound was opened further by joining the two incisions, and more satisfactory irrigation instituted. At operation still more oedema was observed, and although gas bubbles escaped from the depths of the wound the only muscle change was honeycombing of the intermuscular septa. Within six hours of the operation the oedema was less and the temperature had fallen to 99.8° F. The sulphapyridine dosage was continued for another twenty-four hours and then halved again for a day before being discontinued. Post-operatively, 32,000 units of serum was given. Forty-eight hours after operation the tubes were removed, the oedema had completely disappeared, and the wound was open and clean. During the following week progress was uneventful, the wound granulating satisfactorily, and the process of healing has continued up to date.

The points noted in diagnosis and treatment have been: (*a*) presence of massive oedema; (*b*) diagnosis by *x* rays; (*c*) value of serum and sulphapyridine in addition to conservative surgery.

I am indebted to Mr. J. Reid, medical superintendent of the hospital, for the opportunity of treating and recording this case.—I am, etc.,

Wrexham, June 11. JOHN D. MUIR.

War Wounds

SIR,—In his letter on body armour in your issue of June 15 (p. 992) Mr. Kenneth Walker raises the question as to there being a greater number of wounds due to high-velocity projectiles in this war than in the last. It happens that during the recent evacuation of the B.E.F. it fell to my lot to examine a large number of wounded at a hospital which was virtually a casualty clearing station. I can only say that the wounds seemed to me to be of just the same character as those which he and I had to deal with in C.C.S.s in the last war.—I am, etc.,

June 17. A. R. JORDAN.

Simplified Thomas Splint

SIR,—I read with approval the suggestion made by Major R. St. John Lyburn (*Journal*, June 8, p. 934) of a simplified emergency Thomas splint for fractured femur, and consider it should be discussed and brought to the notice of all medical aid parties likely to be engaged *on the spot* in air raids. Numerous cases of fractured femur will do more to hinder the quick removal of a crowd of mixed casualties than the other injuries. If for the gaiter method used in Flanders you substitute a clove hitch and a windlass with it all such cases could be removed in whatever position found and with little space for the moving by giving such patients the "human stretcher." Thereby only two helpers would be needed, and the patients could be removed at the rate of two minutes each from an inferno. I commend this at once to the notice of the St. John and Red Cross units.—I am, etc.,

London, S.E.1, June 16. R. LARKIN, M.D.Lond.

Trench Nephritis

SIR,—The article on trench nephritis in your issue of June 15 (p. 987) is of unusual interest. During the last war, as physician to the Military Hospital at Mile End, I carefully examined forty-two cases of this disease, all of which were subsequent to the acute stage. The results of this examination were published in the *British Medical Journal*, 1917 (September), and they are also set forth, with an addition, in my recent work, *Asthma, Hay Fever, Migraine, and Other Clinical Studies*, London, Lewis. The main fact of this research was the importance of injecting the dye phenolsulphonephthalein as an index of renal function (first noted by Rowntree and Geraghty in 1910) and a sure prognostic agent. This dye was also used as an indicator for the hydrogen-ion concentration of the blood, and the alveolar carbon dioxide tension, after the manner of Sörensen.

Ambard arrived at a law as to the constant relationship between the concentration of urea in the blood and the rate of its excretion by the kidney per unit of time. In nephritis Ambard's coefficient and the phthalein test give fairly parallel results, the latter being most reliable. In those patients who were in the second stage of trench nephritis the urine was usually abundant with albumin, either in high percentage or but slight. Bright blood may be expelled in large or small quantities. Tube casts are almost constantly found. A very striking feature of the test is that it bears no relation whatever to the quantity of albumin or the presence of tube casts. A patient with slight albuminuria *minus* casts may only give an excretion of 20 per cent. phthalein in the hour, while a case in which the urine is loaded with albumin and containing numerous casts may yield a 50 per cent. excretion. These latter recover, but rarely the former. Freyberg (*J. Amer. med. Ass.*, November 16, 1935) recently said: "The degree of albuminuria, haematuria, and hypertension is of little or no pathological importance, but [using this test] the functional capacity of the kidney is an accurate index of the gravity, course, and prognosis of Bright's disease."—I am, etc.,

London, W.1, June 15. A. G. AULD.

Soil and Food

SIR,—We swear to defend our soil—and well we may; but how few think of it as a source of food and of how ill we have treated it! Yet in the opinion of some authorities it could have fed us all. The ill treatment has been the removal of organic products from the land without replacement. "Chemicals" cannot in the long run replace "organics." Disease—of crops and animals and of the human population—is the insidious consequence. We have only begun to awaken to this: Sir Albert Howard has sounded the alarm. We are not the only sinners. The "dust-bowl" of America, the erosion menace of Asia, of Africa, even of New Zealand, already weaken the human race and threaten disaster.

The Lady Eve Balfour has prepared a prospectus, *The Haughley Research Farms*,[1] of what was intended as a test of Sir Albert's thesis. Side by side two farms in Suffolk were to be cropped identically and manured, one with humus made from vegetable wastes and dung, "composted" together according to Howard's prescription, the other with artificials. To make the contrast fair green-crop was to be ploughed into the latter. The same head of stock was to be carried on each, fed severally by the product of the farms. It was even proposed to feed a hamlet on the compost-grown foods.

The war, which makes it difficult to launch the test, is an urgent reason for doing so. Is it realized by our profession what a tremendous opportunity lies here? A principle seems to be involved vital to health. Humus, it seems, is essential to the mycelial root investment which conveys from soil to plant the factors of quality, stamina, and disease resistance—both in plant and consuming animal. Chemical manures are inimical to this *mycorrhizal association*. As they are used it gradually disappears.

For exactly a century the chemical school that arose from the teaching of Liebig has dominated the agricultural intellectuals. The work of Sir Albert Howard[2] has opened our eyes to see that this chemical obsession, so far from defending our soil, has been exploiting it. He perceived how, in the slow processes of Nature, humus is engendered in the forest from decaying leaves, the dung of animals, the labours of worms, the bark tubes of rotted roots; and he used the same principles in so intense a manner that the process is achieved in three months.

The exposition of all these matters in Lady Eve Balfour's prospectus is masterly. Sir Robert Hutchison, P.R.C.P., in a foreword, commends the effort to the medical profession, and Lord Bledisloe to the farming interest. It is to be hoped she receives support. The French peasant women are said to be now feeding France. It is to be hoped that the example of this lady may do something towards feeding England.—I am., etc.,

Holmes Chapel, June 12. LIONEL JAS. PICTON.

Traumatic Extradural Haemorrhage

SIR,—In an article published on June 1 under this heading Professor A. Rendle Short makes a rather startling statement:

> "*Only once in nearly forty years has one of us (A. R. S.) met with a typical case that was correctly diagnosed* and recovered after operation. *Middle meningeal haemorrhage is not very uncommon in the post-mortem room*, but in such cases the lucid interval was usually absent and the diagnosis made was *cerebral compression of unknown character*." (Italics mine.)

Now cerebral compression resulting from middle meningeal haemorrhage, uncomplicated by cerebral laceration, is perfectly curable by operation, however severe the compression and profound the resulting coma may be. It seems that a patient profoundly comatose after a severe head injury, when first seen by the surgeon, is often thought to be in a hopeless

[1] *The Haughley Research Farms*, by the Lady Eve Balfour (from the *Macclesfield Times*, Macclesfield. 2s. 6d. post free).
[2] *The Waste Products of Agriculture*, by Howard and Wad. (Oxford University Press. 1931.)

state, and unless the classical symptoms of meningeal haemorrhage and concussion, with partial return of consciousness and subsequent deepening coma, have been observed, the diagnosis of middle meningeal haemorrhage is not made and surgical intervention is thought to be useless.

Surely the cases in which middle meningeal haemorrhage was only discovered post mortem might have been saved by a comparatively simple operation. If there is any possibility of coma having been the result of cerebral compression by extradural haemorrhage the patient should be given the benefit of the doubt, even if the diagnosis is not certain. A very remarkable illustration of the value of operation in an apparently hopeless case occurred in my own practice about twenty years ago.

A young man, riding a motor bicycle, collided head-on with a motor car. He was picked up unconscious and taken at once to the hospital. On arrival he was found to be in a state of profound coma with widely dilated pupils insensitive to light; there was no corneal reflex, there was a full hard pulse, and respiration was laboured and irregular. I was immediately notified and visited the hospital at once. The house-surgeon was keeping the patient alive by the use of oxygen and artificial respiration. There was evidence of a severe blow on the left parieto-temporal region, and as the symptoms were those of extreme cerebral compression I thought they might be due to middle meningeal haemorrhage. He was immediately transferred to the operating theatre. The administration of oxygen was continued, but naturally no anaesthetic, either general or local, was required. The head was shaved, the scalp cleaned, and the skull opened in the usual situation over the line of the artery by a trephine and by bone-clipping forceps.

The whole of the left hemisphere was depressed for about two inches in depth, from the frontal bone to the tentorium cerebelli, by supradural blood clot, and as much as possible of the clot was removed. The haemorrhage appeared to have ceased, but the artery was ligatured in two places. The wound was then closed with a drain and the patient returned to the ward. As respiration had now become normal no further administration of oxygen was needed.

By next morning consciousness had returned. He was able to take food, but there was complete right-sided hemiplegia with aphasia. This condition continued for a week without any material change, and a second operation seemed advisable. Accordingly, under an anaesthetic, another trephine opening was made in the left occipital region, and the whole of the upper surface of the dura was freed from clot by strips of gauze soaked in antiseptic lotion, drawn from one trephine opening to the other, and the surface was thoroughly irrigated until every trace of clot had been removed. By the following morning the hemiplegia and aphasia had disappeared. Recovery was uninterrupted; within three weeks even his handwriting had become normal, and he was able to leave the hospital. I saw him again after another year, and he had remained perfectly well.

Another case of complete hemiplegia caused by extradural middle meningeal haemorrhage made an equally satisfactory recovery, and two cases of local paralysis—one of the right upper arm and shoulder muscles after compression by an extradural clot for six weeks, and another of a subdural haemorrhage of longer duration—also recovered completely after operation.—I am, etc.,

Worthing, June 9. HERBERT H. BROWN, F.R.C.S.

Dosage of Sulphonamides

SIR,—I have recently seen several patients with unresolved pneumonia and one with hydrocephalus following meningococcal meningitis, all of whom received inadequate dosage of sulphapyridine before being sent into hospital. Doses such as one tablet three times daily, or even one tablet daily, had been employed. It is quite possible that these cases would have pursued a more favourable course had the correct scheme of dosage been employed.

I feel it is very desirable that those busy practitioners who have not time to keep up with the latest literature should know the following points in connexion with sulphapyridine (and also sulphanilamide).

1. Doses should be frequent, preferably four-hourly, to keep an adequate concentration of the drug in the blood stream.

2. Doses should be large, ranging from three tablets in twenty-four hours for an infant and to fifteen tablets in twenty-four hours for an adult. After the first twenty-four hours slightly less may be employed.

3. If there is no response in forty-eight hours the drug will probably be of no value.

4. Small irregular doses may be harmful.—I am, etc.,

F. PIERCE HUDSON, L.R.C.P. and S., D.C.H.

Belmont, Surrey, June 7.

Artificial Respiration

SIR,—Mr. R. T. Payne is right in stressing the claims of prolonged artificial respiration in the treatment of drowning (May 18, p. 819), but one cannot help wondering whether he is quite right in emphasizing so exclusively this physical method, even though he says he has "concentrated mainly on those methods which can be applied at once and on the spot." At the Aberdeen Meeting last year Sir Joseph Barcroft (*British Medical Journal*, 1939, **2**, 986) pointed out that after birth cutaneous stimulation seemed to be more effective in starting respiration than asphyxia. In drowning the sensitivity of the respiratory centre to asphyxia is often very much diminished. As this is so it would certainly seem worth while to see whether the original mechanism by means of cutaneous stimulation is equally paralysed.

A few weeks ago I was called to treat a boy of 11 who had apparently been completely immersed for about fifteen minutes. Artificial respiration was being efficiently performed by a first-aid worker, and the child had begun to make some inspiratory efforts after thirty minutes' work. With the above reasoning in my mind I immediately gave the child an injection of cardiazol-ephedrine and 1/30 grain of strychnine. I then gave the child some smart smacks on the buttock, with the result that within half a minute he had begun to cry lustily and continued to do so until some while after his arrival in hospital. He was still unconscious, and remained so for several hours; in fact, full consciousness was not regained for nearly twenty-four hours. His cry, therefore, was not a conscious response to my castigation. The point of the large dose of strychnine was to try to enhance any reaction there might be to cutaneous stimulation, and so far as one could judge it seems to have been successful. Many years ago the injection of strychnine was a favourite remedy for drowning, but fell into disuse because it was shown that it had very little effect either on the respiratory centre or on the heart beat. If my argument is correct, however, it is possible that the drug may still be reasonably used in an effort to stimulate a mechanism of respiration which is still present though not normally required. There seems no doubt that the treatment I adopted rapidly changed a fitful breathing into violent and continuous respiration.

I may say that the boy made a perfect recovery, but I do not need to detail the other treatment which he received to ward off pneumonia, which appeared likely to prevent his doing so.—I am, etc.,

Winsford, Cheshire, June 10. W. N. LEAK, M.D.

Treatment of Peptic Ulceration in General Practice

SIR,—In August, 1938, I obtained a copy of the *Texas State Medical Journal* (July, 1938, **34**, 214) which contained an account of the work of M. H. Metz and R. W. Lackey, describing a new method of treating gastric and duodenal ulcers.

The treatment is simple, brief, not unpleasant, not expensive, and is based upon sound physiological principles; it brings back to the general practitioner's care a fairly large proportion of patients who have suffered much, and not always profitably, at the hands of the surgical specialist. Night and morning for fourteen days the patient is instructed to sniff up the nostril whole posterior pituitary in a powdered form (I use the preparation made by Endocrines-Spicer, Ltd., Watford). The "pituitary snuff" is supplied to the patient in twenty-eight small packets, all ready for use; he is instructed to place the powder on the back of his left thumb, at the base—to occlude his right nostril—to apply his left nostril to the powder, and to sniff up vigorously, taking care not to waste the powder, as each powder costs 1s. The

nostrils can be used alternately, and the powders used night and morning.

Four panel patients were chosen for a clinical trial: males aged 30, 36, 45, and 58; all had had *x*-ray confirmation of the presence of duodenal ulcer four or five years earlier, and all had been under continuous treatment ever since, receiving the N.H.I. pulv. antacid. each week; all had had periods of relief and periods of exacerbation of symptoms; all had had recent *x*-ray photographs confirming the continued presence of duodenal ulceration. One of these men, aged 45, had no teeth and suffered from occasional attacks of colic due to gall-stones.

Four days after treatment was started all four men reported that they were free of pain and discomfort, and they resumed their normal diet. None of them ceased work during treatment. Three of them have continued up to the time of writing this note free of pain and discomfort; the edentulous 45-year-old man still has occasional gall-stone attacks, periods of flatulence, and constipation. The three who remain well were treated for fourteen days only; at the end of that time they reported themselves as quite fit; the wives of two called later to express thanks, the wife and daughter of the third called several times to express thanks. Recently the 30-year-old man called to say that he had put on 3½ stone in weight in nineteen months; that he had thrown up his job because he felt he was worth more, and that he was now getting £2 15s. a week more. This man's appearance had completely changed; the characteristic facies was gone, his rounded shoulders were held back without effort, his limbs were filled out and powerful. Even at the end of fourteen days' treatment a change for the better was quite noticeable in all four men.

Following on this first attempt I decided to vary the method and tried out, very thoroughly, two other products. These were a complete failure. Since that time the original method has been followed with such complete success that any other seems unnecessary.

I am a member of one of the Military Medical Boards, and told some of my colleagues all about the treatment, with gratifying results to some of their patients. A small number of my private patients have had the treatment, and all have improved. It is, of course, too early to say how long the results will remain successful, and it is to be expected that in time failures may occur. Metz and Lackey state:

"We have now treated seventy-six patients (all but two of whom were males) with peptic ulcer, confirmed by *x*-ray studies, for three years or more, by this method alone. Of these sixty-seven were definitely improved, the symptoms being relieved in from one to ten days, along with gains in weight, strength, and appetite. Comparable results were *not* produced with pituitrin, pitocin, or pitressin. All of these patients were ambulatory and on a regular diet, minus the most indigestible foods."

It has been shown by experiment that while the treatment is being given the acid-forming cells in the gastric mucosa only supply acid while food is present in the stomach, thus giving physiological rest to the ulcerated surface, and that the treatment does not alter the chloride content of the blood.—I am, etc.,

Sunbury-on-Thames, June 11. KENNETH WOLFERSTAN.

Synthetic Radio-elements

SIR,—With reference to Surgeon Rear-Admiral C. M. Beadnell's letter on the above subject (June 1, p. 911), the following remarks may be relevant.

The only element found in the body in any quantity and naturally radio-active is potassium[1]; normal sodium is not radio-active. The number of β-particles given off by 40 g. of potassium in one second is about 1,200[1]; the number of synaptic nerve junctions in the body[2,3] probably exceeds 10^{11}; this gives one β-particle per junction every three years. Exposure to light, visible or ultra-violet, does not affect the radio-activity of this or any other substance[4]; perhaps the writer is referring to the unrelated photo-electric effect. Nor has any nuclear disintegration yet been produced by electrons.[5] The list of nuclear disintegrations given contains two errors, probably typographical: $^{14}_{7}N$ becomes $^{16}_{8}O$,[6] and $^{17}_{8}O$ is stable.[7]

The radio-activity observed by Dr. Free in the bone of one who had died of radium poisoning was doubtless due to the accumulation of radium in the trabeculae of the bones[8]; the half-life being about 1,600 years, its activity would naturally persist. The half-lives of the artificial radio-elements so far discovered are nearly all less than a week.[9]

The number of particles obtained from artificial radio-elements formed by bombardment with the α rays of Ra and its products, or with neutrons produced by those α rays, would be far less than (at best 1:20,000 of) the number emitted by the Ra during the irradiation.[10] The use of such bodies as radium substitutes would thus be uneconomic. Radiosodium so produced has, however, been used as an indicator in biological investigations.[11]

Economic substitutes for radium rays might be provided by fast particles from a cyclotron or high-tension apparatus; or by neutrons produced by these particles; or by the rays of radiosodium, etc., produced by these particles or neutrons. Artificial sources can be prepared far stronger than the amount of radium usually available. This has, however, been discussed elsewhere.[12,13]

Investigation of artificial radio-activity is continuously going on in physical laboratories, and the potentialities of all elements, including those of bone, are being tested. As chemical combination does not influence radio-active properties, the use of elements in the form of bone dust would have no influence except to give a more complex mixture of radiations.—I am, etc.,

Magdalen College, Oxford, June 4. R. E. PATTLE.

REFERENCES

1 Rasetti. *Nuclear Physics*, p. 40.
2 Herrick. *Introduction to Neurology*, p. 28.
3 Le Gros Clark. *Tissues of the Body*, p. 294.
4 Rasetti. *Nuclear Physics*, p. 4.
5 Ibid., Ch. VI.
6 Ibid., p. 272.
7 Ibid., p. 157.
8 Clark, A. J. *Applied Pharmacology*, 6th edition, pp. 153, 560.
9 Rasetti. *Nuclear Physics*, p. 272.
10 Ibid., p. 234.
11 Griffiths and Macgraith. *Nature*, 1939, **143**, 159.
12 Chadwick. Ibid., 1938, **142**, 630.
13 Mann. Ibid., 1939, **143**, 583.

Ehlers-Danlos Disease

SIR,—I was particularly interested to read the account of the case of Ehlers-Danlos disease in the *Journal* of June 15 (p. 974), because during the winter session of 1891–2 I saw a similar case in Edinburgh.

The victim, a man apparently about 25 years of age, came to Edinburgh with a show which took up its quarters in the Waverly Market, and he was a side show. Dr. Allan Jameson demonstrated him in the skin clinic in the Edinburgh Royal Infirmary, when I saw him. The man was able to raise above his forehead the skin covering his chest and pull out the skin of his arm eight or ten inches without apparent discomfort. The skin had a soft indescribable feel and a peculiar white colour. He had a large oval scar some five inches long and three inches across at its widest point. This, his attendant said, was caused by a very small portion of the skin having been taken for examination by a dermatologist in Vienna. I understood the man came from that part of Europe and he could not speak English. He did, however, escape the fate of being a human tombstone.—I am, etc.,

Bushey, Herts, June 15. THOMAS FENTEM, M.D.

Emotional Factors in Disease

SIR,—Your annotations in the issue of June 8 on the pathogenesis of rosacea (p. 937) and on retinitis centralis serosa (p. 939) are timely, and afford another instance of the changed attitude of the profession towards psychopathology. The emotional factor in rosacea, long known to psychologists, may now be openly mentioned without fear of ridicule. It requires little imagination to see a similar factor in Horniker's "angio-neurotic diathesis" causing retinal effusions. After all, has it not been shown that severe irido-cyclitis can be caused within an hour by simple contact of the unbroken skin with the contents of an egg? Any channel of action other than a mental one seems impossible. And if such things can happen, why not systematically consider their possibility in other diseases?

For many years the association of acute glaucoma—a condition very suggestive of an angioneurotic attack—with emotional states has been accepted. In an article in the *Lancet* (December 7, 1929) I showed that even repressed emotion can precipitate this disease. Few days pass without my getting striking evidence of similar processes in lesions of the conjunctiva, cornea (the occurrence of corneal ulcers in rosacea should be remembered), iris, choroid, and retina. A retinal effusion, emotionally determined, seems to have been the cause of retinal detachment in several of my patients, while I have had reason to believe that sudden blindness from retro-ocular neuritis has been due to oedema similarly induced. If this is true, it follows that the early lesions of disseminated sclerosis, so frequently associated with a history of retro-ocular neuritis, had better be viewed in terms of multiple lesions like Horniker's retinal effusions, and treatment directed towards the predisposing morbid emotional states.—I am, etc.,

Portsmouth, June 13. W. S. INMAN.

Pituitary Extract and Insulin

SIR,—The antagonism in the action of pituitary extract and insulin is very clearly demonstrated in the article by Professor H. P. Himsworth in the *Journal* of May 4, wherein he records his very brilliant researches. They receive confirmation from the consideration of glycosuria in acromegaly and the influence of irradiation of the pituitary gland in this disease (and Cushing's disease).

In the case of animals made diabetic by extirpation of the pancreas Houssay showed that the glycosuria is mitigated and life prolonged by pituitary ablation. This appears to be the converse of the insensitive diabetic to some extent, but not entirely so, for as there can be no secretion of insulin in the pancreatectomized animal the question of antagonism to insulin does not arise. There must, of course, be some action on the part of the pituitary extract opposed to what would be an insulin effect if there were any insulin present, but not a simple pituitary *versus* insulin reaction, in the absence of insulin. It is not difficult to postulate what this may be, without any stretch of the imagination. The explanation seems to me to be that the oxidation of glucose is primarily independent of either insulin or pituitary, and that the former acts as an accelerator and the latter as an inhibitor of normal combustion. The fact that life is possible for a short time in the pancreatectomized dog, and for a still longer period in the Houssay dog, is evidence that oxidation of carbohydrate material can proceed—unsatisfactorily, no doubt, in its magnitude—in the total absence of insulin. Hyperglycaemia would not be a simple result of failure of oxidation but Nature's compensatory effort to maintain a greater head of glucose available for oxidation.—I am, etc.,

London, W.12. O. ECCLES, M.D.

Hypermetabolism in Thyrotoxicosis

SIR,—Dr. Laurence Martin raises important questions in his interesting review (June 8, p. 927). In addition to the particular aspects of the problem selected for commentary by Dr. Robertson in his letter of June 15 (p. 995), a word may well be said regarding the general relation of hypermetabolism to the syndrome which we term "thyrotoxicosis."

Thyrotoxicosis is a complicated endocrine disturbance with protean clinical manifestations, but the presence of thyroid toxaemia and hypermetabolism are implicit in the diagnosis. Confusion arises from the nature of the disease and the imperfection of our methods of measurement. On the one hand the thyroid toxaemia, though most important, is but one part of the syndrome and may be overshadowed clinically by exophthalmos, to which it bears but an indirect relationship. In some cases the excessive thyroid secretion does not cause obvious physical signs; in others it is mild in degree, or fugitive. On the other hand it must be admitted that the diagnosis of thyrotoxicosis in border-line cases is necessarily a matter of opinion, for there is at present no exact or direct method of measuring the amount of hormone secreted by the gland and the indirect methods available are not wholly reliable. The metabolism of resting tissues as measured by the basal metabolism test gives only an indirect indication of the activity of the gland. Though it has many fallacies, the test, if carefully done, provides a reasonably accurate method of measuring the severity of the thyroid toxaemia. It should be emphasized, however, that its application is limited to this component of the patient's clinical state.

The importance of considering the psycho-physical constitution of the individual in relation to the degree of thyroid toxaemia is nowhere better illustrated than in the case of acute psychosis or cardiac failure. For example, where auricular fibrillation and anasarca are present the patient is gravely ill, yet the basal metabolic rate may be but little raised, especially when allowance is made for the effect of dyspnoea. In these cases it will be found that old age or associated disease of the cardiovascular system is a contributory factor in the clinical picture. Similarly in patients with acute psychosis the soil is of the greatest importance, and no laboratory or other test which measures only the thyroid toxaemia has more than a partial bearing on the case. Thus the final assessment of the patient's condition must always be a clinical one. Experience shows that in some goitrous patients, notably those with auricular fibrillation, unearthing even a mild degree of hyperthyroidism is of cardinal importance. Thyroidectomy may be indicated even if the evidence is equivocal. But the same is not true where the clinical picture is overlaid with neurotic or psychotic features; here a significant degree of thyroid toxaemia must be present for thyroidectomy to have any logical part in treatment.—I am, etc.,

London, S.W.1, June 17. FRANK RUNDLE.

The Red Cross Emblem in Warfare

SIR,—In the reorganization and reconstruction of our resources, has not the moment arrived for the democratic belligerents to review the whole question of the use of the Red Cross emblem in warfare as conditioned by totalitarian methods of waging war? In all wars since and including the 1914–18 war the totalitarian nations have not respected the Red Cross; in 1914–18 this violation of humanitarian principles was sporadic, but in all subsequent wars it has been part and parcel of the military strategy and tactics of the enemy. The Red Cross emblem, inaugurated as a symbol of appeal to chivalrous opponents, has ceased to afford immunity at the hands of an unchivalrous and ruthless foe. The trend of warfare during the last fortnight has given the lie to all military strategy based on experience of the last war. Among other anomalies, that of non-combatancy and humanitarian immunity of the medical service is "dead wood" which should be cut out with the rest.

From a military point of view, the flagging of every post from front line to base with the Red Cross emblem, and thus to implement fully the position of complete reliance on respect for the Red Cross, would be madness on the part of a commander opposed to a totalitarian enemy, since by plotting the medical units and their disposition the enemy could form an accurate estimate of the disposition and concentration of the forces opposed to him. By all means let us treat our wounded enemies with Christian forbearance, but let us also be Christian realists and refrain from subjecting our own wounded to the selective murderous attacks which kill wounded, women and children, and non-combatants without pity and of set totalitarian purpose. The Red Cross has become an invitation to attack without fear of retaliation.—I am, etc.,

Bradford, June 12. A. HAYES SMITH, M.D.

Resources of British X-ray Industry

SIR,—There seems to be prevalent an idea that the manufacturing resources of the British *x*-ray industry will be insufficient for war requirements. In actual fact the various firms manufacturing *x*-ray apparatus in this country are not so fully occupied, and in some cases have actually been able to accept orders for other work of national importance. The only difficulty has arisen from the fact that there have been delays in some instances in placing orders until the apparatus

is urgently required. We can say quite definitely that the manufacturing capacity for *x*-ray equipment in Great Britain is abundantly equal to all demands made upon it for war requirements.—We are, etc.,

GEOFFREY PEARCE,
Managing Director, Watson and Sons Ltd.
W. E. SCHALL, B.Sc., F.Inst.P.,
Governing Director, Schall and Son Ltd.
R. S. WRIGHT,
Managing Director, Newton and Wright Ltd.

London, June 12.

The Ladies' Guild needs Help

SIR,—The Ladies' Guild begs to place before your readers the need for help in money, clothing, and personal service in its work of assisting widows and children who are beneficiaries of the Royal Medical Benevolent Fund. There are large numbers of those who through age and infirmity require regular money grants; to them our failure would mean destitution. Many subsisting on meagre incomes require gifts of coal, clothing, and invalid comforts—all beyond their own resources. There are widows left suddenly with families in the critical stages of education; if we can help them the family may become self-supporting, otherwise they are overwhelmed and sink into extreme poverty.

We are facing these difficult times with an excess of expenditure over income and with the prospect of reduced revenue and increased responsibilities, but if every woman connected with the profession would subscribe to the Guild (the minimum is 2s. 6d.) all demands could be met. Subscriptions should be sent to the Honorary Treasurer, Ladies' Guild of the Royal Medical Benevolent Fund, Tavistock House (North), Tavistock Square, London, W.C.1.—I am, etc.,

LAETITIA N. HUTCHISON,
President.

June 11.

Obituary

F. J. STEWARD, M.S., F.R.C.S.

Consulting Surgeon, Guy's Hospital

Mr. Francis James Steward, the well-known Guy's surgeon, died at Kingswood on May 31 at the age of 68. He was born in Hampshire, the son of J. D. Steward, and after schooldays at Bedford entered Guy's Hospital with an open scholarship in science. At the intermediate M.B. examination of the University of London in 1892 he gained an exhibition and gold medals, and at the final examination in 1894 he was awarded first-class honours in medicine, obstetric medicine, and forensic medicine. He took the English Conjoint diplomas in the following year and became F.R.C.S.Eng. and M.S.Lond. in 1897. Having held house appointments at Guy's Steward was for a time demonstrator of anatomy in the medical school and worked in the throat department; then after election as assistant surgeon to the hospital he was given charge of the throat department and appointed lecturer in anatomy. He was also for some years assistant surgeon, and later surgeon, to the Hospital for Sick Children, Great Ormond Street. In 1902 his name appeared jointly with W. H. A. Jacobson's on the title-page of the fourth edition of *The Operations of Surgery*. Mr. Jacobson himself was responsible for the revision of the greater part of the first volume and for the new illustrations; the remainder of the work he placed in the hands of his junior colleague at Guy's.

From 1920 to 1936 Mr. Steward was a member of the Council of the Royal College of Surgeons of England, and for the last four of those years he represented the College on the General Medical Council. He held office as vice-president of the Section of Diseases of Children at the Annual Meeting of the British Medical Association in London in 1910, and as vice-president of the Section of Surgery at the Edinburgh Meeting in 1927, and he served for some years on the Consultants Board of the Association.

Mr. W. M. Mollison writes:

Francis James Steward entered Guy's in 1889, and worked there continuously till his retirement in 1932. As a student he had a brilliant record, gaining prizes and the Treasurer's gold medal for surgery; he also obtained first-class honours in the London M.B. After holding teaching posts—anatomy and surgical pathology—in the medical school he was elected assistant surgeon in 1900; two years later he took charge of the throat department, succeeding Charters Symonds, and till 1912, when he became surgeon to the hospital. Not unnaturally Steward always remained interested in throat work, and his help was often sought in the diagnosis of unusual cases long after he had ceased to be in charge of the department. He was an excellent teacher, and students appointed as throat dressers judged themselves most fortunate, as indeed they did when working for him as surgeon's dressers.

Steward was one of the most fair-minded of men; he demanded accuracy of observation and carrying-out of instructions, but he never let down those working for him—even the most junior—a trait that endeared him to all his assistants. As a diagnostician he was in the front rank, and his deftness at the examination of patients and in operating was unrivalled; if he had a fault it was his insistence on an opinion once given—perhaps no bad fault in a teacher. For many years Steward edited the *Guy's Hospital Reports*, from 1908 till 1922, when with French he brought out the War Memorial number, in which he wrote an account of the 2nd London General Hospital at which he worked. He wrote little, but assisted Jacobson with a fresh edition of *The Operations of Surgery*. It is perhaps of historic interest to quote a passage from one paper he wrote in the reports on oesophageal growths: "It may be mentioned that *x*-ray examination has now been made in all cases of oesophageal obstruction coming to the throat department as a matter of routine. The results obtained made it clear that this method of examination is seldom of assistance either in detecting the presence of a stricture or in locating it, except in cases where the stenosis is already extreme. On the other hand the findings have on occasion been decidedly misleading."

Steward was a member of the Council of the Royal College of Surgeons for sixteen years and for a time a Vice-President. For a few years before his death he served on the council of the London and Counties Medical Protection Society, where his balanced judgment was much appreciated. "Frankie," as he was affectionately known, was an enthusiastic supporter of many of the non-professional sides of hospital life, and jealous of the success of Guy's whether as a hospital or as a medical school. Those who saw him with his family realized the affection he inspired and felt: the death of his elder son some few years back in British Guiana was a blow from which he could not really recover.

DR. HERBERT RICHARD HURTER (writes E. I. C.) was a leading Liverpool family physician in general medical practice in Grassendale. His passing leaves a great gap in the profession. It is given to few of those in general practice to reach the high honour of president of the Liverpool Medical Institution; well do I remember his masterly presidential address. In the practice of his profession Dr. Hurter was the essence of what a true physician should be, and in team work an idealist and a veritable implanter of his own keenness. During his long illness his thoughts were always with his team, the Medical Board of which he was proud to be chairman. He had the courtly manners of the Victorian physician, and so deeply was he beloved by his patients that the Parish Church of Garston on June 6 was filled with those present at his memorial service.

Universities and Colleges

UNIVERSITY OF WALES

WELSH NATIONAL SCHOOL OF MEDICINE

The following candidates have satisfied the examiners at the examinations indicated:

M.B., B.CH.—*Medicine:* *Beryl Badham, Doreen M. E. Cranch, Joan B. Davies, T. C. H. Davies, I. L. R. Evans, Helen C. Hodges, D. D. Howell, O. Howell, D. H. Jenkins, R. T. Jenkins, G. A. Jones, J. V. Jones, Anne N. M. Llewhelin, Mary E. Lloyd, Brenda M. Mead, R. E. Packer, Mary G. Powell, H. V. Roberts, D. C. Taylor, C. Thomas, C. E. Thomas, Margaret R. Wade, T. Walker.

M.B., B.CH.—*Pathology and Bacteriology:* M. S. Berkovitz, T. W. Brokovski, J. E. Crane, Sadie M. Davies, G. B. Downs, M. B. Evans, E. H. Horton, M. E. Humphreys, E. R. Jones, J. H. Joseph, G. MacL. Lewis, *W. C. D. Lovett, B. F. Martin, T. F. McCarthy, D. McCracken, Betty J. Mollin, D. L. Mollin, Tessie Phillips, *R. D. Richards, D. Shiers, E. Spickett, H. G. Williams, R. W. Williams.

* With distinction.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

An ordinary meeting of the Council was held on June 13, with the President, Mr. Hugh Lett, in the chair.

Resolutions of condolence were passed on the deaths of Mr. F. J. Steward, a past Vice-President, and Mr. L. Bathe Rawling, a past member of the Court of Examiners. Reference was also made to the death in action of Mr. Laurence O'Shaughnessy, F.R.C.S., a former College Research Scholar.

It was decided to hold an additional Final Fellowship Examination in February, 1941.

It was reported that the Sir Gilbert Blane Medal for 1940 had been awarded to Surgeon Lieutenant-Commander P. K. Fraser, R.N., for his original work, "A Study of Superficial Ringworm Infections."

The Council accepted with grateful thanks from Lieutenant A. E. Humble, R.N.V.R., a portrait of Anthony White, a past President of the College.

It was decided to recognize Ancoats Hospital, Manchester, under the conditions of paragraphs 21 and 23 of the Fellowship Regulations in respect of the posts of resident surgical officer and first and second house-surgeons.

Examiners were elected for the ensuing year.

Diplomas of Fellowship were granted to the following forty-three candidates:

C. H. Bliss, H. F. Anderson, T. McM. Boyle, O. Lloyd, W. D. Park, A. W. Bone, C. H. Tanner, G. P. Arden, J. C. Newbold, Kathleen M. Robinson, A. S. Aldis, P. M. Kelly, E. M. Evans, A. D. Le Vay, Perin K. Mullaferoze, W. B. Waterfall, E. G. Dolton, N. Vere-Hodge, M. H. Harmer, J. I. P. James, A. G. McPherson, N. J. Dhondy, V. K. Desai, G. G. Cooley, H. Abd-El-Aziz, P. Berbrayer, R. Blunden, A. K. Dutta Gupta, M. H. El Zeneiny, R. M. Fawzi, W. R. Gayton, A. Gild, J. M. J. Jens, P. J. Kenny, D. H. Mackay, A. M. Minaisy, M. S. K. Rudd, M. L. A. Samie, K. C. Sarbadhikari, H. K. Sett, A. H. M. E. Sharkawi, B. K. Sheorey, J. Swinney.

Diplomas in Anaesthetics were granted, jointly with the Royal College of Physicians, to the following twenty-seven candidates:

J. B. Bamford, Katharine M. Banks, J. F. J. Bereen, D. J. A. Brown, K. C. Brown, S. Carden, P. C. Conran, J. R. Dunn, R. A. Gordon, K. C. Grigor, F. R. Gusterson, W. E. Hadden, S. R. T. Headley, E. Isaacson, Mary K. W. Langston, J. D. Laycock, J. A. Lee, S. Mark, P. J. W. Mills, W. W. Mushin, E. A. Pask, L. M. Shorvon, M. R. W. Spacek, W. N. Taylor, K. B. Thornton, Joan Watts, H. D. Wyse.

The Services

DISTINGUISHED SERVICE CROSS: ROYAL NAVY

The King has approved the award of the Distinguished Service Cross to Surgeon Lieutenant Arthur Philip Booth Waind, R.N.V.R. (H.M.S. *Hardy*), and Surgeon Lieutenant Kenneth William Donald, R.N. (H.M.S. *Hotspur*), for daring, resource, and devotion to duty in the first Battle of Narvik.

Medical News

The National Council for Mental Hygiene held a public meeting at Manson House, Portland Place, W., on June 18, when Colonel J. R. Rees, M.D., gave an address on "Strategic Planning for Mental Health."

The meeting of the Swiss Society of the Medicine of Accidents and Occupational Diseases which was to have been held on May 25 and 26 has been postponed to June 29 and 30 at the Zurich Surgical Clinic.

At a meeting of the Section of Surgery of the Royal Society of Medicine on Wednesday, June 26, Mr. Kenneth Walker will read a paper on the protection of the soldier in warfare. The subsequent discussion will be opened by Lord Horder, followed by Colonel Sir Charles Gordon-Watson, Sir Harold Gillies, and others.

The forty-second annual meeting of the Medical Library Association will be held at the Medical School of the University of Oregon, U.S.A., on June 25, under the presidency of Colonel Harold W. Jones, of the Army Medical Library, Washington, D.C.

One of the most complete surveys of air raid precautions in all its aspects is given in the "Protect Your Homes" exhibition at the Housing Centre, 13, Suffolk Street, S.W.1, opened on June 19 by Mr. Harold Nicolson, M.P., Parliamentary Secretary, Ministry of Information, supported by Wing-Commander Hodsoll, Inspector-General, Ministry of Home Security. Photographs showing every device adopted by A.R.P. authorities throughout the country form the basis of the exhibition, giving a complete telescopic and detailed view of this complex machine of civil defence. The exhibition will continue until Saturday, July 13. Arrangements may be made with the Housing Centre for the reception of organized parties from A.R.P. depots, A.R.P. committees, schools, institutions, local authorities, etc.

Medical Notes in Parliament

Subjects of health, education, and evacuation were discussed during a debate in the House of Commons on June 18 on the Estimates for the Scottish Department of Health.

Casualty and Hospital Services

On June 13 the House discussed a token vote to defray the cost of measures in England and Wales to deal with casualties and disease, expenses connected with evacuation, and other services arising out of the war. Mr. MALCOLM MACDONALD said in the event of an attempted invasion of this country any civilians left in the area of those operations should stay where they were. Before operations started the Government might compulsorily evacuate a considerable proportion of the local population. With regard to movement from "target areas," the great industrial centres, to areas less congested and less likely to be attacked, the Government took the view that evacuation from these congested areas should not be compulsory. The categories chosen for voluntary evacuation included expectant mothers in the last months of pregnancy. These were going from London almost every day as they expressed the desire to be taken to reception areas. In military necessity the Government would contemplate compulsory evacuation of children and others as well. It would not be necessary to separate families. Of the children who went to reception areas at the beginning of the war a large proportion had remained in those districts and were taller, stronger, and healthier as a result of their stay. Children had been removed from the East Coast, and the evacuation of 120,000 London children would continue for the next six days. All

the children were going west of London, and most to Cornwall, Devonshire, Somerset, and Wales. The officers of the Ministry of Health were available in those areas to ease the problems.

Speaking on the emergency hospital scheme, Mr. MacDonald said that during the past two weeks several thousand military casualties from Dunkirk and other parts of the front had been distributed to more than fifty hospitals, including a few hospitals in Scotland. Reports showed that in general the arrangements for reception and care of wounded had worked smoothly and satisfactorily. There had been inevitable hitches, and the reports would be studied to correct any faults of machinery or of personnel. To go round the regions and report on how the system worked he had chosen Mr. Colville, lately Secretary for Scotland, accompanied by Mr. Rock Carling, the surgeon, who advised the Ministry on casualty services, and Mr. Bearn, the chief supply officer. In the next few weeks they would visit every region to discuss matters on the spot. They were concerned in the administration of the emergency hospital scheme itself, the supply of beds, of nurses, of doctors, etc. There was no limit to their inquiries.

NEED FOR MORE PHYSIOTHERAPY DEPARTMENTS

Sir FRANCIS FREMANTLE said the Government had rightly decided not to expand the military hospitals to the extent they were expanded in the last war, but to have a system based on the civil hospitals under the local authorities. But there were disadvantages in this system. It introduced a difficult division of authority in the hospitals. Representations had been made from the civil side of these hospitals that the senior officers should be given military rank, status, and uniform. Matters were complicated by the need for the hospital authorities to refer to the county council, the Poor Law authority, or the Ministry of Health in such matters as the building of huts needed as additions to the hospitals. Local authorities should be made to understand they must move quickly or would have their hands forced. It was difficult to apportion blame, but patients who came back from the Front had not the advantage of up-to-date treatment and their convalescence had therefore been delayed. By up-to-date treatment he meant massage, surgical manipulation, electrical treatment, and occupational therapy. The Ministry of Health had offered services, and payment for services, to local hospitals which had been unwilling to accept the offers and start departments for this treatment. Specialists in this work in hospitals all over the country complained that they were not sufficiently used. Did the Ministry intend to get a proper department of massage and physical medicine in every hospital under its charge? Delay had been caused not only by the Ministry but through medical officers themselves, for medicine was a conservative profession and slow to take up new ideas.

Sir ERNEST GRAHAM-LITTLE said the emergency medical services in London had been most criticized. The scheme was based on the fallacious conception that the best treatment for war casualties could be found not in London but ten or twenty miles out. It created dissatisfaction among the staffs, who found their professional careers arrested. It also meant a cessation of medical education in London, which was responsible for more than half the medical education given in this country. He submitted that treatment could best be given centrally and that the Minister should not rely in future on committees for advice but should consult a small executive body with first-hand knowledge.

Professor Trueta had found at Barcelona that immediate attention was needed unless 40 or 50 per cent. of the air raid casualties were to be fatal. First-aid centres must be inside hospitals, where the cases could be "vetted." It was impossible to envisage the transport of seriously injured persons out of London during an air raid. The doctors in charge of first-aid posts would not be competent to deal with the casualties, being totally unfamiliar with this type of injury.

COMPULSORY INOCULATION

Captain ELLISTON said the Ministry of Health should consider compulsory inoculation against the possible transfer of infection from town to country children. Dental surgeons should by a short postgraduate course be qualified to assist as anaesthetists at Emergency Medical Service hospitals and should be employed at first-aid posts. They had sufficient medical knowledge for the work of those posts. Mr. VIANT said that in the last three months he had attended a country hospital organized to meet war conditions and had been struck by the inadequate number of nurses. The county authority had been compelled by the Ministry of Health to deplete its staff by 50 per cent. and send half to another establishment.

Miss HORSBRUGH, replying to the debate, said in the past two weeks wonderful work had been done in the hospitals by the stretcher-bearers, surgeons, and nurses. An advisory committee had been set up on physiotherapy, and Mr. MacDonald was anxious that its decisions should be carried out. Sir E. Graham-Little must remember that air raid casualties had to be dealt with in the middle of a raid. Surgical personnel and equipment must be mobile. It would be disastrous to have too many expert surgeons in certain places. All the points raised that day would be looked into, but the Ministry had later experience than Barcelona—the experience of what was happening every day in different countries. Hospitals receiving casualties and other hospitals would both be fully staffed again when the patients came in. In each district the names of nurses and sisters were kept in a pool. If any hospital was now understaffed they could give it more staff. They had nurses waiting to go to the hospitals where staff was required.

Government's Milk Policy

On June 11 Mr. BOOTHBY, in a statement on the Government's milk programme, said that the Government fully recognized the paramount importance of milk in the diet of the people of this country, and regarded it as essential to maintain milk production at a level which would ensure a continuance of adequate supplies for those who needed it most. The Ministry of Food had recently completed a detailed investigation into the costs of distributing milk, and the Minister of Agriculture was satisfied that these costs had increased since the outbreak of war. The milk distributors had therefore been informed that an increased margin would be allowed for the period up to September 30 next. In the interval the Minister was arranging for an exhaustive inquiry into the present system of distribution with a view to bringing about a substantial reduction in the cost. Meanwhile there was no alternative but to increase the retail price of milk by 4d. a gallon from July 1. A comprehensive national scheme was now in preparation which it was hoped to bring into operation on July 1, under which one pint of milk would be available daily at the much-reduced price of 2d. a pint for the expectant or nursing mother and to children under school age in every household which desired to take advantage of the scheme.

The scheme would also make provision for the supply of milk free of charge to those households which could not afford to buy it. A simple criterion of need would be necessary to prevent abuse, but there was no intention of instituting a detailed inquiry in the form of a "means test." The scheme would be administered under the central authority of the Ministry of Food through local officers. It would take the place of the arrangements in force in certain areas under the scheme put forward by the Ministry of Health shortly before the outbreak of war, but would in no way affect the milk-in-schools scheme. It would not affect the power of a local authority to supply an additional quantity of milk under its own arrangements to any person on the advice of the medical officer of health.

T.A.B. Inoculations

On June 11 Mr. ALFRED EDWARDS asked the Secretary of State for War whether, in view of the fact that men were unable to perform their duties for forty-eight hours and sometimes much longer after each T.A.B. inoculation, he would consider suspending this practice during the present emergency. Mr. LAW replied that the proportion of men unfit for duty within forty-eight hours of inoculation was not great, and his advisers did not recommend any change in the present practice.

The Red Cross on Hospitals.—On June 11 Mr. GROVES asked the Minister of Health whether he would give instructions that the red crosses displayed by most of the British hospitals advertising their presence to airmen should be obliterated. Mr. MACDONALD said that civil hospitals were not ordinarily entitled to display the red cross. The conditions under which it could be displayed had already been made public in a Press announcement by the Home Office.

Increased Drug Prices.—On June 11 Sir ANDREW DUNCAN, replying to Mr. Sorensen, said he was informed that the extent to which the prices of various drugs and medicines had increased since the outbreak of war varied very considerably. As from June 10 drugs and medicines, other than dispensed medicines, had been brought under the Prices of Goods Act.

Milk and the Public Health.—Mr. MALCOLM MACDONALD told Mr. David Adams on June 13 that he knew the problems presented by the liability of milk to infection. Recognizing the value of pasteurization as a protection against such risks he was considering what action he could take to secure the best results from its use. Practical difficulties, particularly those of securing further pasteurizing plant, were involved at present, but when conditions permitted he would seek any powers that might be necessary and capable of general application to secure the adequate protection of the public health.

Workers' Hours and Holidays.—In a reply to Sir George Davies on June 13 Mr. ASSHETON said the Government asked for a general cancellation or postponement of holidays. Seven-day working without adequate periods of rest was not an efficient method of production if continued for any length of time. Periodical rest periods were necessary even on urgent priority work. Arrangements should be made to provide such rest periods, which should include the building up as quickly as possible of a staff which would allow one day's rest periodically for the personnel.

Conscription Age for Doctors.—On June 18 Mr. ASSHETON, replying to Mr. Groves, declined to extend the age for conscripting doctors to 60 years. He also said he would not consider calling up doctors irrespective of their age groups and in such numbers as might be desired.

EPIDEMIOLOGICAL NOTES

Infectious Diseases during the Week

During the week there were notable increases in the incidence of diphtheria, scarlet fever, measles, and whooping-cough in England and Wales.

Measles is still largely centred in Lancaster 1,846 (1,753), Yorks, West Riding, 1,220 (1,097), Leicester 578 (704), and Durham 563 (424). Next in order are Nottinghamshire 344 (313), Surrey 236 (216), Glamorgan 230 (265), and Buckinghamshire 226 (208). The disease has invaded rural and urban districts more heavily than large towns in proportion to the population, probably by reason of the growth in numbers of non-immunes evacuated. Manchester 222, and Liverpool 85, are affected, as the disease is rife in the whole county of Lancaster, but not to the same extent as the smaller city of Leicester 431, while London 35, and Birmingham 22, have practically escaped so far. In Scotland the increase has been relatively greater than in England and Wales; notifications have risen by 243 and the disease has spread to two more administrative areas—namely: Dundee B. 2, Ayr B. 2, Renfrew C. 1, Ross and Cromarty 1—but has disappeared from Aberdeen and Falkirk burghs, where there were 1 and 3 cases in the previous week. The chief centres of measles in Scotland are Glasgow 809, Lanark C. 118, Greenock 103, Edinburgh 96, Dunfermline 53, Kirkcaldy 38, and Rutherglen 32.

Paratyphoid fever continues in Northumberland and Durham: Northumberland 12 (Newcastle-upon-Tyne 1, Newbiggin-by-Sea U.D. 9, Bedlingtonshire 2); Durham 3 (Sunderland 1, Whickham 2). No information is available as to the source of the outbreak. The outbreak of paratyphoid in Oldham borough and district, in which the first cases were notified in the week ended April 20, and the last in the week ended May 11, has been reported upon by the medical officer of health, who stated that there were 5 cases in the borough and 20 in the Oldham area; the source of infection was food prepared in a bakery where three of the employees were found to be suffering from the infection; they were removed to hospital.

No. 22

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended June 1, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1940					1939 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	275	17	63	1	8	30	4	8	2	—
Deaths		2	8				—	1		
Diphtheria	766	36	253	30	30	717	92	195	49	17
Deaths	13	—	8	—	—	10	1	7	3	—
Dysentery	36	8	34	—	—	31	10	23	—	—
Deaths			1	—	—			—	—	—
Encephalitis lethargica, acute	2	—	1	—	—	5	1	—	—	—
Deaths		—	3				—	1		
Enteric (typhoid and paratyphoid) fever	39	4	7	3	—	25	1	38	65	2
Deaths	3	1	—	1	—	2	—	—	—	—
Erysipelas			41	4	5			66	6	5
Deaths		—	1				—	2		
Infective enteritis or diarrhoea under 2 years										
Deaths	31	—	9	3	8	39	7	7	3	3
Measles*	7,842	35	1,304		78		38	192		8
Deaths	4	—	4	—	1	3	—	—	2	1
Ophthalmia neonatorum	105	8	26		—	99	13	29		—
Deaths										
Pneumonia, influenzal†	644	34	4	15	8	728	60	8	3	18
Deaths (from influenza)	19	2	—	—	—	14	1	2	—	—
Pneumonia, primary Deaths‡		25	226	19	12		10	225	22	9
				1					8	
Polio-encephalitis, acute	—	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	4	1	1	1	—	13	2	2	—	—
Deaths		—	—				—	—		
Puerperal fever	5	5	18	2	—	2	2	13	2	—
Deaths		—					1§			
Puerperal pyrexia	157	12	16		—	193	15	15		2
Deaths										
Relapsing fever	—	—			—	2	—			—
Deaths										
Scarlet fever	1,079	57	132	62	96	1,427	135	203	53	70
Deaths	1	—	—	—	—	1	—	2	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	1	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	633	6	63		17		282	236		19
Deaths	2	—	—	3	—	18	4	4	—	—
Deaths (0-1 year)	294	43	64	27	26	285	39	64	20	18
Infant mortality rate (per 1,000 live births)						45	34			
Deaths (excluding stillbirths)	4,364	733	604	204	166	3,974	673	604	169	145
Annual death rate (per 1,000 persons living)			12.2	13.6	14.6	9.8	8.6	12.2	11.4	12.7
Live births	7,443	1,130	1,023	401	294	5,866	1,024	972	345	307
Annual rate per 1,000 persons living			20.7	26.8	25.8	14.4	13.1	19.7	23.2	27.0
Stillbirths	249	28	40			233	42	47		
Rate per 1,000 total births (including stillborn)			38			39	39	46		

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

§ Death from puerperal sepsis.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

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QUERIES AND ANSWERS

A Case of Sterility

Mr. REYNOLD H. BOYD, F.R.C.S.Ed. (London, W.), writes: In reply to "A. K.'s" question in Queries and Answers, June 15, may I state: (1) The escape of semen from the vagina immediately after intercourse is quite a common occurrence. (2) This escape can be a contributory cause of sterility, more especially if penetration is incomplete and ejaculation occurs just within the vaginal entrance. (3) The simplest corrective procedure is the use of a Hodge pessary, under the upper bar of which a pool of semen remains long after the rest has escaped.

Who First Differentiated Gonorrhoea from Syphilis?

"J. R. W." writes: I should like to draw attention to what appears to be a slight error in the Nova et Vetera in the *Journal* of June 15 by "J. D. R." I think it is clearly made out that the first person to differentiate gonorrhoea from syphilis was Benjamin Bell in 1793, *confirmed* by Ricord in 1831.

Book for Ship Surgeon

"J. S. M." writes: Replying, unavoidably belatedly, to "J. A. K.'s" request (May 4, p. 756) for a book for a ship surgeon, please allow me heartily to commend Dr. Vavasour Elder's *Ship-surgeon's Handbook*, in which "J. A. K." will find Dr. Elder an admirable guide, philosopher, and friend in all matters pertaining to the practice of medicine on the high seas. In view of recent chemotherapeutic advances I feel sure that Dr. Elder will agree that certain sections on treatment now require revision, and perhaps he will see his way to produce a new edition before long. Lejar's *Urgent Surgery* (tr. by Dickie and Ward) would be a very good companion to the above. Hamilton Bailey's excellent *Emergency Surgery* is a book for *surgeons*, not for the *surgeon-perforce*—that is, the average ship surgeon.

Income Tax

Repairs to Premises

"D. R.'s" surgery premises form part of his house and he is allowed one-half the cost of the repairs of the house, except that he gets the total cost as regards waiting room and surgery. Can he claim half the cost of repairs to kitchen and back garden?

*** No. If he gets the whole cost on those parts of the premises which are wholly professional he will have to accept the converse—none of the cost on parts wholly personal. Any sums which have been claimed as deductions from profits cannot be included in the special "maintenance claim" against the property assessment.

Payment—Whether "Interest" or Not

"BMF/BI" has entered into an agreement for an advance under which he has covenanted to pay "interest thereon at the rate of £6 10s. per cent. per annum" provided that if certain specified conditions are complied with by him the lending company "will repay or allow" to him by way of rebate at the termination of the loan a sum equal to the difference between the total amount actually paid for interest and the total amount on a £5 10s. per cent. basis. What is the legal rate of interest payable—6½ per cent. or 5½ per cent.?

*** In our view 6½ per cent. There seems to be no escape from that conclusion on the terms of the agreement. For one thing the "rebate" is conditional, and for another the borrower undertakes to pay at 6½ per cent. Whether on receiving—by way of offset or otherwise—the "rebate" at the end of the term of the loan our correspondent can then claim a review of his tax liability over the whole period is another and rather more difficult question.

LETTERS, NOTES, ETC.

Medicine and Economics in Wartime

Mr. JOHN W. STRETTON, F.R.C.S. (Kidderminster), writes: May I suggest the importance of our reviewing at the present time the treatment of patients so as to obtain the maximum of their work. A hernia is an example—a man at work with a truss is more valuable than a man convalescing after herniotomy. Again, if a herniotomy must be performed, should not the period of convalescence be reduced from ordinary standards?

A Warning

A medical woman practising in Deptford, S.E., reports that a man aged between 25 and 30 years, clean shaven and of moderate build, with dark oily hair, masquerading as the manager of a local cinema, has been calling on people in the district asking for subscriptions for comforts for the Forces. He called on our correspondent and was offered a cheque, but said he would rather have cash. This made her suspicious, and she informed the police. Such a person is known by them to have been operating in other districts. If any reader should recognize him from this description he should be detained and a telephone message sent to the nearest police station without delay.

Enlarged Thymus in Infant

Dr. GEOFFREY FARRER (Leeds) writes: I received an urgent call to a baby aged 3 months 1 week; on arrival about ten minutes later I found the child already dead. It was the only child of healthy parents, and up to this stage had had an extremely healthy existence from birth. A post-mortem examination was performed, and no abnormality was found with the exception of a thymus gland weighing 2½ oz., this being nearly five times the normal weight for this age. I think there is no doubt that the presence of this abnormally large thymus was a direct predisposing cause of the child's sudden death.

Refugee Doctors

"H. C. S." writes: I have lived in this country and worked in hospitals as a duly qualified medical practitioner and specialist for over five years. I considered it therefore my duty to offer my services to the medical branch of any of the three fighting Services, in order to show my gratitude to this country, which has given me shelter and a new home. To my regret, however, in view of the existing Service regulations, all my applications have been unsuccessful. Many refugee doctors, like myself, deeply regret that they are not allowed to join in the common cause, and that they are to remain of so little use in the present emergency, when the heavy demands for medical personnel arising out of the war are so frequently stressed and discussed. New regulations even require the hospitals, where some have worked for years, to dispense with their services. I feel certain that the infiltration of "fifth columnists" could be checked effectively by careful scrutiny, without depriving all those who are genuinely anxious to serve this country of the possibility to do their share.

Union of Students

Mr. J. G. TAYLOR writes: Please allow me, on behalf of the Students' Union of St. Mary's Hospital, W., of which I am honorary secretary, to state in your columns that our union has informed the National Union of Students of our complete severance from that organization, because we consider that it is not pursuing its avowed aim of forwarding the interests of the students of this country.